

Journal

OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

Joint Pan American-AVMA Meeting, Kansas City, August 23-27, 1959

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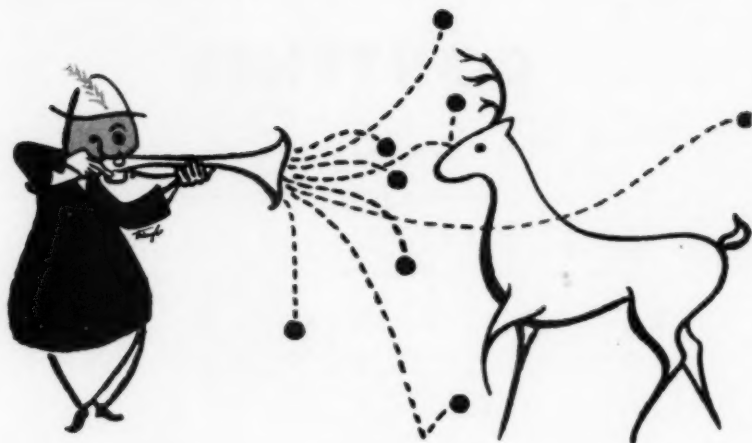
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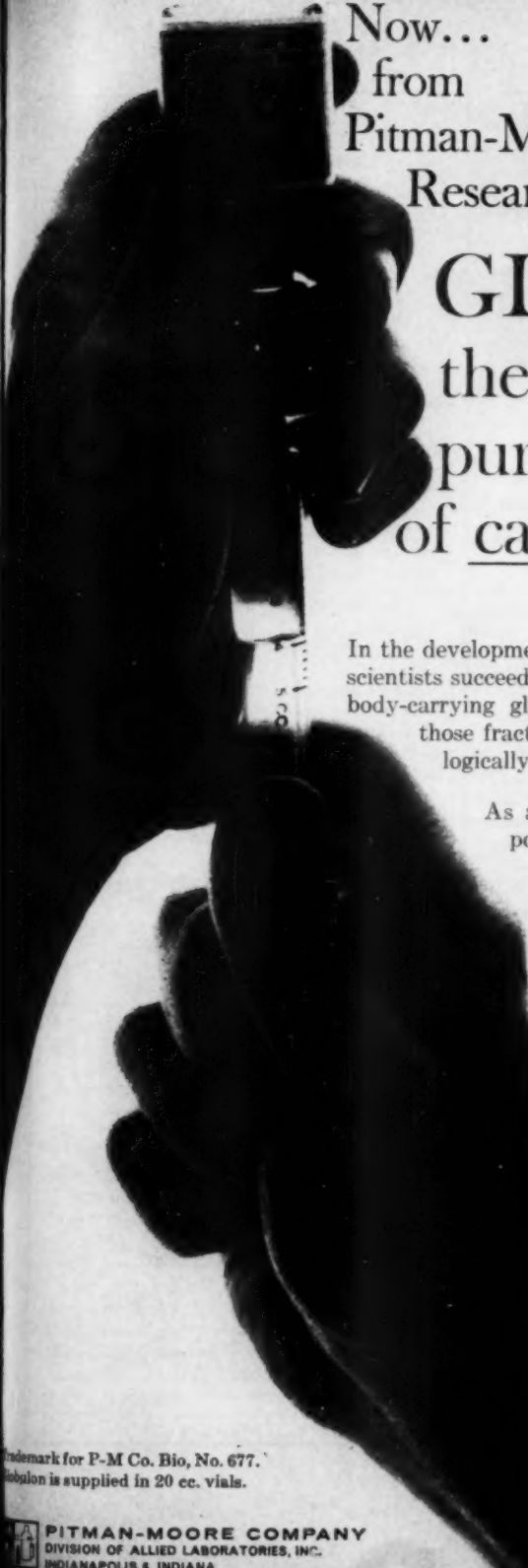
EDITORIAL STAFF: W. A. Aitken, *Editor Emeritus*; Donald A. Price, *Editor in Chief*; H. E. Kingman, Jr., *Managing Editor*; Eva G. Bailey, *Assistant to the Editors*.

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Correspondence

April 28, 1959

Dear Dr. Aitken:

Your recent editorial (March 1, 1959, JOURNAL: 240) on shipping fever research was stimulating. Knowing your personal interest in the disease, I believe you will find the enclosed report (see p. 153) a significant contribution to our knowledge of the pathogenesis of respiratory infections in cattle.

I will leave the assignment of the article to whichever journal you prefer.

Sincerely,

s/A. B. HOERLIEN, D.V.M.

[Also, see article by R. C. Reisinger *et al.* (p. 147).]

✱ ✱ ✱

May 19, 1959

Dear Dr. Aitken:

I hope the reprints of my article "Bovine Respiratory Infections. I. Psittacosis-Lymphogranuloma Venereum Group of Viruses as Etiological Agents" arrive soon (see March 1, 1959, JOURNAL: 222-230). I am at least two months and 50 reprint requests behind on spreading glad tidings to the world on our favorite subject. Requests for reprints have come from three continents and from Maine to California. I am biased, of course, but hope this is a slight penetration into the unknown of bovine respiratory infections.

I thank you for the editorial that accompanied this article. Truer words were never spoken about "familiarity," "indifference," and ignoring an ever-present pestilence. I share your feelings concerning "order out of chaos" and hope that we can shed "more light" on the condition. If nothing else, I hope this article will suggest a new line of investigation for some, or stimulate someone to prove this work wrong.

Sincerely,

s/J. L. PALOTAY, D.V.M.

Time Is Growing SHORT . . .

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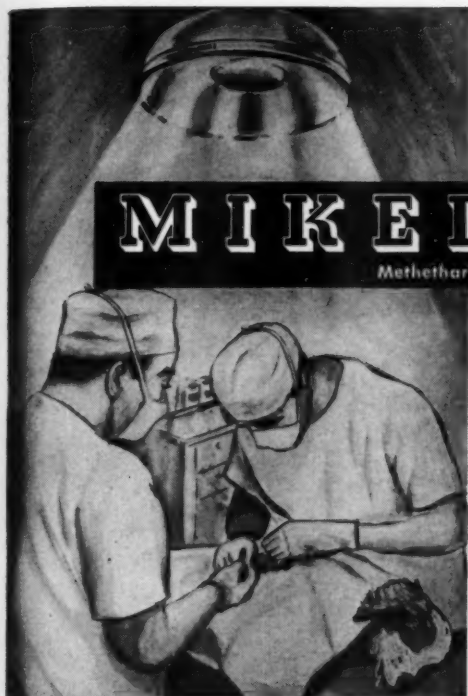
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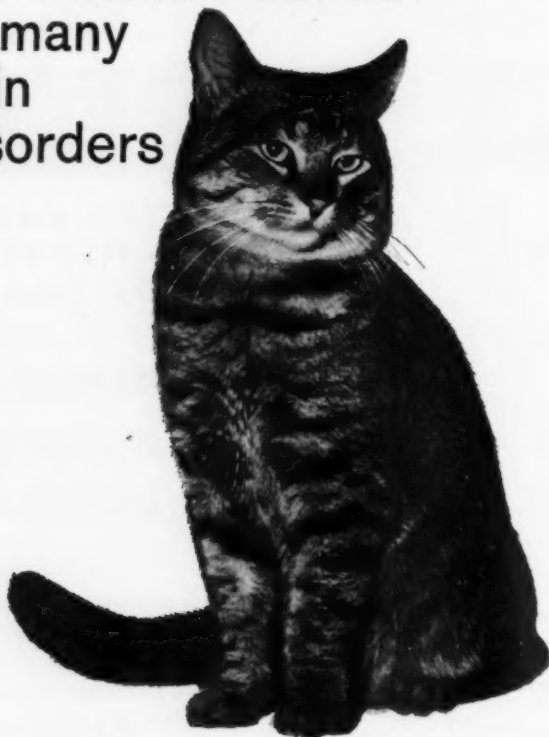
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FROM THE AVMA WASHINGTON OFFICE

news from Washington ...

**U.S.D.A. Appropriations,
Fiscal Year 1960**

U.S.D.A. appropriations for fiscal year 1960 passed Congress June 30, following committee conference adjusting differences (see JOURNAL, July 1, 1959, adv. p. 14). Includes for ARS (all research), \$67,722,490; amount for humane slaughter research reduced to \$100,000. Plant, animal disease, pest control, \$49,800,600; includes \$16,250,000 for brucellosis eradication, a reduction of \$3,750,000 provided for fiscal 1959, but \$1,250,000 more than 1960 budget request or House-passed bill. Also includes \$35,000 for eradication of sheep scabies. Meat inspection, \$21,324,900, an increase of \$189,800 more than proposed by House; AMS poultry inspection, \$10,203,000.

Livestock and Poultry Disease

Senate Agricultural Committee favorably reported with amendments S. 864, greater protection against diseases of livestock and poultry (see JOURNAL, June 15, 1959, adv. p. 12).

Graduate Training Programs

House Interstate and Foreign Commerce Committee favorably reported bill H.R. 6325 for five years, programs providing for graduate training of professional public health personnel.

**Health Benefits, Federal
Employees**

Senate Post Office and Civil Service Committee favorably reported with amendments S. 2162, to provide a health benefits program for government employees.

**Medical Insurance, O.A.S.I.
Recipients**

House Ways and Means Committee commenced hearings July 13, on H.R. 4700, to amend Social Security Act to provide insurance for the cost of hospital, nursing home, and surgical services for those eligible for O.A.S.I. benefits (see JOURNAL, March 15, 1959, adv. p. 16).

International Medicine

Senator Humphrey's subcommittee, Committee on Government Operations, held hearings July 9 and 16, relative to implementation of legislation in field of international medicine, including research.

International Health Research

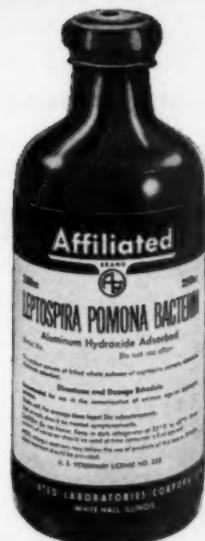
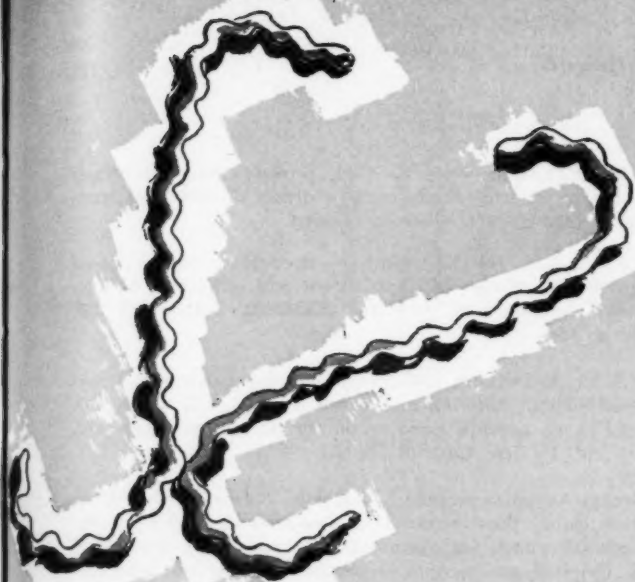
Subcommittee on Health and Safety, House Interstate and Foreign Commerce Committee, began public hearings July 21-23 on bills relating to international health research: S. J. Res. 41 (see JOURNAL, June 15, 1959, adv. p. 16), H. J. Res. 211, 237, 293, 361, 370, and 443.

**National Scientific Personnel
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WASHINGTON NEWS—Continued

- Armed Forces Institute of Pathology** H. R. 7871, Rep. Price (D., Ill.), provides that the officer serving as director shall hold the grade of brigadier general or rear admiral while so serving.
- P.H.S. Commissioned Corps** S. 2220, Sen. Hill (D., Ala.), to strengthen commissioned corps P.H.S. relative to appointment and retirement of personnel; supersedes S. 185 (see JOURNAL, Feb. 15, 1959, adv. p. 16).
- Social Security Act Amendments** S. 2225, to increase amount of earnings persons are permitted without suffering deductions from \$1,200 to \$1,800. S. 2226, to provide extra credit for postponed retirement. Both bills by Sen. Case (R., N. J.).
- Seventh Annual Antibiotic Symposium** Seventh Annual Antibiotic Symposium, November 4-6, Mayflower Hotel, Washington, D.C. Deadline for 200-word abstracts of reports for presentation at meeting is September 14. Original manuscripts, in duplicate, must be submitted by October 15, to Dr. Henry Welch, Director, Division of Antibiotics, Food and Drug Administration, Dept. of HEW, Washington 25, D.C.

Instructions to Authors

JOURNAL of the AVMA

Exclusive Publication.—Articles submitted for publication are accepted with the understanding that they are not submitted to other journals, which is ethical publication procedure.

Manuscripts.—Manuscripts, including footnotes, references, and tables, must be typewritten, double-spaced, on 8½- by 11-in. bond paper, and the original and one carbon copy, submitted. One-inch margins should be allowed on the sides, with 2 in. at top and bottom. Articles should be concise. Short, simple sentences are clearer and more forceful than long, complex ones.

Illustrations.—Photographs should be furnished in glossy prints, and of a size that will fit into the JOURNAL of the American Veterinary Medical Association with a minimum of reduction. Photomicrographs which can not be reduced should be marked for cropping to 1-column or 2-column width. Identifying marks within the photomicrographs, such as arrows, letters, or numbers, should be clearly marked with black India ink or white opaque ink to insure good contrast for reproduction and must be large enough to stand reduction, if necessary.

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Tables.—Tables should be simple and typed double space. Complex tables are not conducive to perusal. It is wiser to summarize complex material than to tabulate it.

References.—References should be typed double space, in alphabetical order, and should be prepared in the following style: name of author, title of article, name of periodical with volume, year, and page numbers. References to journals not commonly known should give the complete name of the periodical, and where published so that they may be added to our reference files. When books are cited, the name of publisher, location, edition, and year should be given.

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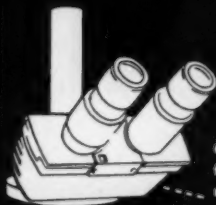
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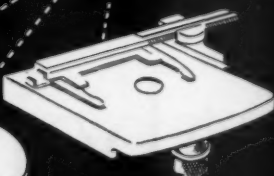
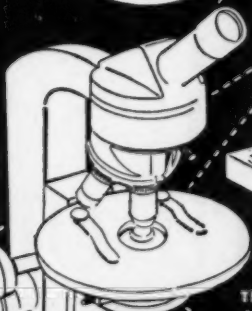
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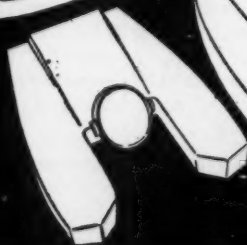
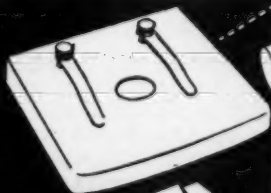
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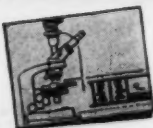


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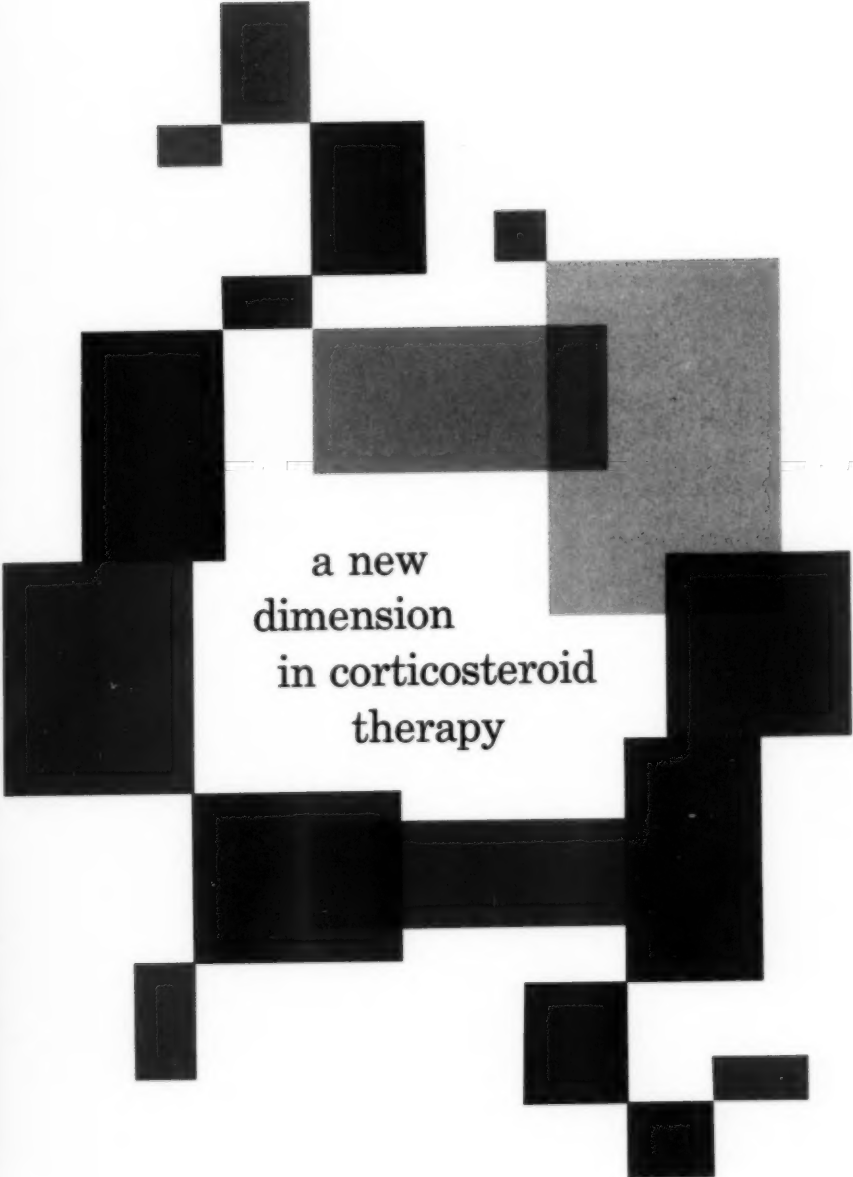
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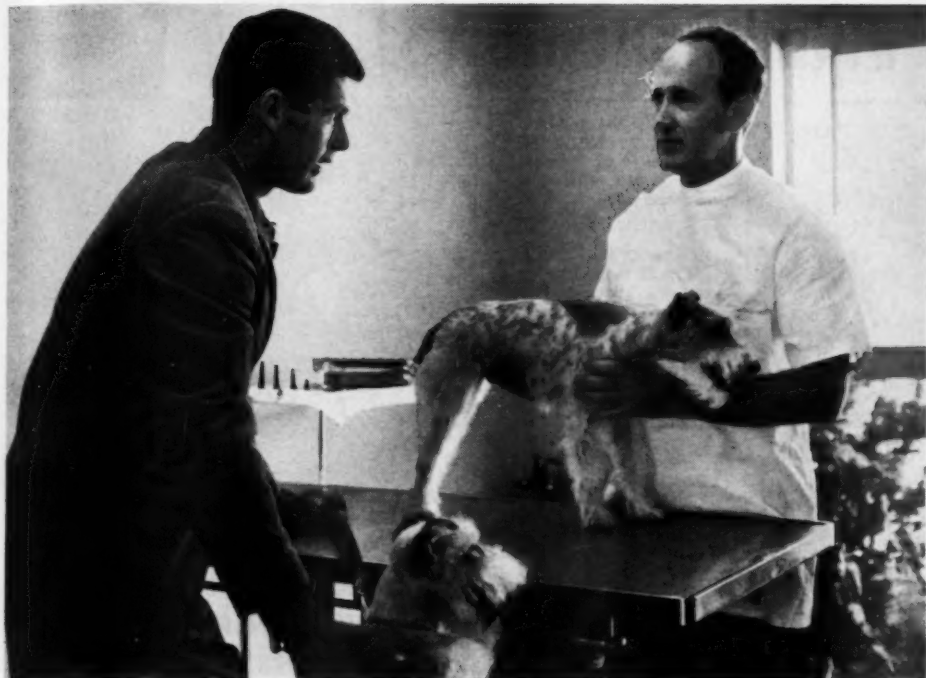
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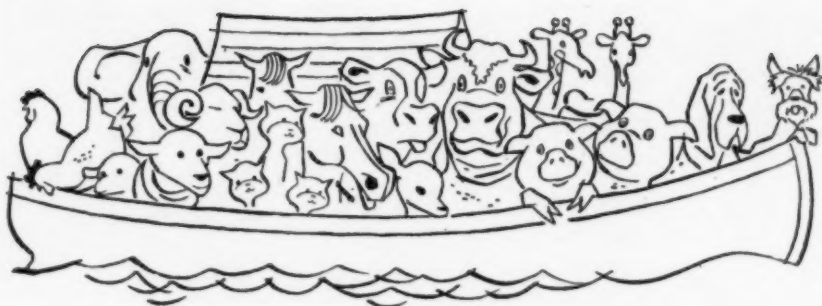
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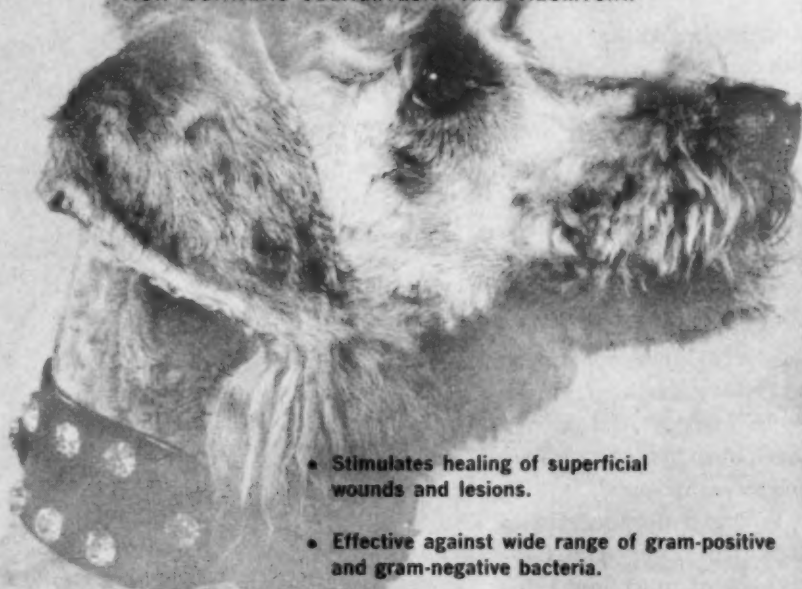


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A Myxovirus (SF-4) Associated with Shipping Fever of Cattle

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C. A. MANTHEI, D.V.M.

Beltsville, Maryland

PASTEURILLA SPP. have long been known to be associated with a bovine respiratory disease complex commonly called "shipping fever." These organisms also have been found in apparently healthy cattle, and vaccination of animals with such organisms has resulted at best in questionable prophylaxis. Furthermore, it has not been possible to consistently produce the clinical entity of shipping fever by exposure of animals to Pasteurella isolated from animals with shipping fever.⁶ Thus it is perhaps an understatement that the etiological picture of shipping fever is obscure.

The purpose of the present study is to determine infectious agents associated with clinical shipping fever and to assess their importance as etiological factors of the disease.

A hemagglutinating virus (SF-4) of the Myxovirus group³ was originally isolated from nasal mucus of calves showing clinical signs of shipping fever.

MATERIALS AND METHODS

Source of Specimens.—Samples of nasal mucus and blood included in this study

From the Bacterial and Mycotic Diseases Section, Animal Disease and Parasite Research Division, Agricultural Research Service, U.S.D.A., Beltsville, Md.

The authors acknowledge the technical assistance of Dr. F. R. Abinanti and his co-workers of the Laboratory of Infectious Diseases, Institute of Allergy & Infectious Diseases, National Institute of Health, Bethesda, Md. for their part in the isolation and identification of the infectious bovine rhinotracheitis virus and the second recovery of SF-4 virus, and in the culturing of nasal swabs from four lots of healthy cattle. The authors also thank Major W. V. Howells and Lt. Colonel F. D. Maurer of the Armed Forces Institute of Pathology, Walter Reed Army Medical Center, Washington, D.C., for the preparation of slides demonstrating intranuclear and intracytoplasmic eosinophilic inclusions produced in bovine kidney tissue cultures infected with SF-4 virus.

were collected from four groups of feeder calves which had recently passed through sales yards and from four other groups of feeder calves on their home farms, shortly before they were sent through sales yards. Some animals in each of the first four groups showed clinical signs of shipping fever, whereas animals in the latter four groups were apparently healthy.

Collection of Specimens for Isolation of Infectious Agents.—Nasal mucus was collected by inserting a sterile cotton-tipped 6-inch wooden applicator stick into each nostril. The swab used for virus isolation was twirled in a screw-capped vial containing 3 to 5 ml. of Hank's solution with 0.25 per cent lactalbumin hydrolysate and 400 µg. streptomycin, 400 units penicillin, 40 µg. tetracycline (Achromycin*), and 200 units nystatin (Mycostatin**) per milliliter. These samples were stored in a dry-ice chest (-65 C.) until inoculated into tissue cultures. The paired swab used for bacterial isolation was twirled in a tube containing approximately 10 ml. of 1 per cent peptone broth. The broth samples were plated within several hours after collection or after storage overnight at 4 to 7 C.

Serum Collection and Storage.—Blood specimens were drawn in 50-ml. glass tubes and allowed to clot at room temperature. The serum was separated from the clot by centrifugation and stored in rubber-stoppered vials in the dry-ice chest.

Tissue Culture.—Tissue cultures of bovine kidney were prepared in tubes as described by Madin *et al.*⁵ Cells were grown in a nutrient medium of Hank's solution with 0.25 per cent lactalbumin hydrolysate and 10 per cent calf serum. This medium was replaced with a maintenance medium consisting of Hank's solution containing 0.5 per cent lactalbumin and no serum, before inoculation of

*Achromycin, crystalline, for intravenous use is produced by Lederle Labs., Pearl River, N.Y.; **Mycostatin, sterile powder, for laboratory use is produced by E. R. Squibb & Sons, Brooklyn, N.Y.

cultures. Antibiotics (100 units penicillin, 100 μ g. streptomycin, 10 μ g. tetracycline, and 50 units nystatin per milliliter) were added to both mediums.

Virus Isolation.—Samples of nasal mucus were thawed quickly under running water and then lightly centrifuged to sediment gross particles. In some cases, samples were not centrifuged because of the possibility that much of the virus present might be attached to, and sedimented with, the mucus. Each supernatant (0.2 to 0.4 ml.) was inoculated into each of two tissue-culture tubes containing 0.8 ml. of maintenance medium. This material was left for one to three hours to allow adsorption of virus to the cell sheet. It was then poured off, and 1 ml. of fresh maintenance medium was added to each tube. In some cases, the original inoculum and maintenance medium were not removed.

Bacterial Isolation.—Samples were incubated for one to three hours at 37 C. immediately before being streaked on dextrose-starch agar and on blood agar base (Difco) to which 5 per cent defibrinated bovine blood was added. The inoculated plates were incubated under aerobic conditions at 37 C. for varying lengths of time.

Hemagglutination.—Hemagglutination tests were performed with 0.25 per cent guinea pig erythrocyte suspension. Equal volumes (0.5 ml.) of serial twofold dilutions of the material to be tested for hemagglutinin activity and erythrocyte suspension were shaken and allowed to sediment for approximately one and one half hours at room temperature (24 to 27 C.). The diluent in all tests was 0.85 per cent sodium chloride solution at a pH of 5.6 to 6.5.

Hemagglutination-inhibition (H-I) tests were performed with 0.25 ml. serial twofold dilutions of inactivated (56 C. for 30 minutes) serum and an equal volume of hemagglutinin diluted to contain 4 units. After incubation for 20 minutes at room temperature (24 to 27 C.), 0.25 ml. of a 0.25 per cent suspension of guinea pig erythrocytes was added to each tube. The test was read after further incubation for one hour at room temperature. The reciprocal of the highest dilution of serum inhibiting agglutination was considered its H-I titer.

A nonspecific H-I titer as high as 1:64 was present in some bovine serums. Receptor-destroying enzyme (RDE) treatment removed most or all of the nonspecific inhibitor for SF-4 hemagglutinin in most serums to a titer of 1:16 or less. Treatment with RDE, derived from *Vibrio cholerae* culture filtrate,[†] did not lower the specific H-I titer in the serums tested.

Receptor-Destroying Enzyme.—Receptor-destroying enzyme activity was titrated by the method of Burnet and Stone.⁴ The diluent used in these titrations was the calcium acetate saline buffer pH 6.2 described by Ada and Stone.⁵

RDE Treatment of Serum.—Equal volumes of 1:4 dilution of serum and of RDE were incubated

for 16 hours at 37 C. and then inactivated at 56 C. for 30 minutes.

Hemadsorption.—The hemadsorption technique was employed in the manner described by Vogel and Shelokov,³⁰ using a 0.25 per cent suspension of guinea pig erythrocytes.

Infectivity Titrations and Neutralization Tests in Tissue Culture.—Virus was titered for infectivity by inoculating 0.2 ml. of tenfold dilutions of the test suspension into each of two tubes of calf kidney cultures. Cultures were observed daily through the eighth day after inoculations. The 50 per cent end point was calculated by the method of Reed and Muench.⁹ Neutralization tests were conducted with twofold dilutions of serum and an equal amount of virus suspension. These were incubated for one hour at room temperature and inoculated in 0.2-ml. amounts into each of two tissue-culture tubes, and the final readings were made on the sixth day after inoculation. The reciprocal of the highest dilution of serum showing neutralization in both tubes was considered its neutralization titer.

Infectious Bovine Rhinotracheitis (IBR) Serum and Virus.—Bovine anti-IBR serum was supplied by one laboratory[‡] and the Pitman-Moore Co. strain of IBR virus from another.[§]

Exposure of Experimental Calves.—Holstein-Friesian calves, 4 to 8 months old, were selected from the Animal Disease Station clean herd which had not had any contagious respiratory infections. Moreover, all animals tested did not have H-I titers higher than 1:8 and no cytopathogenic agents could be demonstrated in tissue culture. The first 2 calves were exposed to an aerosol of 5 ml. of freshly harvested second-passage tissue-culture fluids containing 13 million 50 per cent tissue culture infective dose (t.c.i.d.₅₀) of virus per milliliter. The aerosol was produced with a Vaponefrin^{*} plastic nebulizer.

The calf's head was placed inside a large plastic tube, one end of which was then secured tightly around the neck of the calf with wide tape. The nebulizer, which was attached to an air pump with a hose, was introduced into the other end of the plastic tube, which was then held tightly around the arm of the operator. Each calf was forced to breathe and rebreathe its expired air mixed with the aerosol until lack of oxygen and increase of carbon dioxide in the mixture caused forced deep respiration. Exposure was for approximately 20 to 30 minutes, during which time the calf was allowed to breathe fresh air for short inter-

[‡]By Major W. V. Howells and Lt. Colonel F. D. Maurer of the Armed Forces Institute of Pathology; [§]by Dr. F. R. Abinanti of the National Institutes of Health.

^{*}Produced by Vaponefrin Co., Upper Darby, Pa.

[†]Supplied by Dr. F. R. Abinanti.

vals when the oxygen inside the plastic bag became depleted.

Two other calves were exposed 70 days later to an aerosol of 5 ml. of second-passage tissue-culture fluids containing 1.3 million t.c.i.d.₅₀ of virus per milliliter which had been handled in a different manner from that used for exposure of the first 2 calves. This virus suspension was stored in the dry-ice chest for three days, then thawed and divided into aliquots, and again stored in the dry-ice chest for two days before being used for exposure of calves.

Temperatures of calves were taken twice daily—at 8:30 a.m. and 2:30 p.m.

RESULTS

CLINICAL SIGNS

Some of the animals in all groups of sick calves which we had the opportunity to study showed varying degrees of the following clinical signs: rapid respiration, cough, mucoid or mucopurulent nasal discharge, lacrimation, conjunctivitis, inappetence, and elevated temperature.

The clinical signs, together with histories of recent transportation or exposure to additions to the herd, were used to establish a criterion for diagnosing shipping fever. Specimens were collected on this basis in an attempt to isolate infectious agents associated with the disease.

VIRUS ISOLATION

A hemagglutinating virus (SF-4) was isolated from 2 of 11 recently purchased (Jan. 27, 1958) grade Angus feeder steers, approximately 8 months old and 435 lb. in weight, showing signs of shipping fever. Nasal mucus was collected from all animals on January 28 and 30 and on February 12. Specimens obtained January 28 and 30 were inoculated into tissue cultures on January 31, and two virus isolations were made—one from calf JT-4 (Jan. 28 specimen) and one from calf JT-10 (Jan. 30 specimen). Virus was again isolated from these specimens when they were inoculated into tissue cultures on April 16. No virus isolation was made from specimens collected on February 12 and inoculated into tissue cultures on April 16.

In the three paired serums available from this herd, original H-I titers of 1:32, 1:64, and 1:256 all increased to 1:512 15 days later (table 1). No early serum was available from calf JT-4, but its H-I titer 15 days

after virus isolation was 1:512. No early or late serum was available from calf JT-10. *Pasteurella multocida* was isolated from 5 of the 11 calves.

TABLE 1.—Comparative Hemagglutination-Inhibition (H-I) Titers of Bovine Serums Against SF-4 Virus

Status and identification of calves	H-I titer*	
Artificial exposure	Before exposure	21 days later
ADS-1	8	256
ADS-2	8	256
ADS-3	0	512
ADS-4	0	256
	During acute or early convalescent stage	
Natural exposure		15 days later
JT-R	32	512
JT-2	64	512
JT-4	**	512
JT-160	256	512
Natural exposure	At time of virus isolation	72 days later
AH-795	16	512
AH-795	16	512

*Reciprocal of highest serum dilution causing complete inhibition; **no acute serum available, virus isolated at this time.

SF-4 virus was again isolated in April, 1958. This isolation was from 1 (AH-795) of 40 recently purchased Hereford feeder calves located on a different farm from the Angus calves. Calf AH-795 showed no grossly observable signs of shipping fever when nasal mucus was collected, but there was a rise in H-I antibody titer from 1:16 at the time the virus was isolated to 1:512 72 days later.

The 40 Hereford calves had originated on eight different farms. Eighteen strains of *Pasteurella* were isolated from 17 of the calves. *Pasteurella multocida* was isolated from 10 calves, *Pasteurella gallinarum* from 3, and *Pasteurella hemolytica* from 3, and both *Past. multocida* and *Past. gallinarum* were isolated from 1 calf. No *Pasteurella* were isolated from calf AH-795. The herdsman reported clinical signs of shipping fever in 1 animal (calf AH-777) only. This animal had been treated with large doses of penicillin and streptomycin 24 hours before samples of nasal mucus were taken, and no virus or *Pasteurella* was recovered. Serum taken 72 days later was negative for H-I antibody against the SF-4 virus and for neutralizing antibody against IBR virus.

EXPERIMENTAL INFECTION

Four calves exposed to an aerosol of SF-4 virus showed a rise in temperature which began 24 to 72 hours after exposure and continued five to seven days. The lowest

maximum temperature recorded was 103.8 F.; the highest 104.6 F. Maximum temperatures of all calves occurred on postexposure days four or five (table 2). Temperatures taken in the afternoon, within one hour after exposure, were somewhat higher than pre-exposure temperatures. This rise was considered due to the struggling and forced respiration of the calves during ex-

required six to seven days to produce observable changes. Nonspecific inhibitors were present in some normal calf serums (negative to H-I test) and in the one lot of pooled lamb serums tested, and when these serums were added to the tissue-culture mediums, the CPE of the virus was delayed.

The virus grew readily in swine kidney cultures. Intracellular and intracytoplasmic eosinophilic inclusions were produced in calf kidney tissue cultures.

TABLE 2—Temperatures (F.) of Calves Exposed Artificially to SF-4 Virus

Day	Calf ADS-1		Calf ADS-2		Calf ADS-3		Calf ADS-4	
	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.
-2	101.8	102.0	101.6	101.8	101.6	101.8	102.2	102.0
-1	101.6	101.8	101.4	102.0	101.6	102.0	101.8	102.0
0*	101.8	102.6	101.8	102.4	101.4	102.2	101.0	102.4
1	102.4	102.8	101.8	103.0	101.8	102.4	101.2	102.4
2	103.4	102.4	102.4	103.4	102.0	102.0	102.0	102.6
3	102.0	102.6	102.4	103.2	102.2	102.8	102.0	104.0
4	102.6	102.6	103.6	104.4	103.0	104.6	102.8	104.4
5	103.8	103.0	103.6	103.3	102.0	104.0	104.0	103.8
6	102.0	102.0	103.0	103.2	103.2	103.4	103.1	103.0
7	101.4	102.4	102.4	102.2	101.0	101.6	101.0	101.5
8	101.6	101.8	102.4	102.0	101.4	-----	101.6	-----
9	101.0	102.0	101.0	101.6	101.0	101.4	101.2	101.6

*Time of exposure: 2 p.m.

posure. Varying degrees of lacrimation, conjunctivitis, increased nasal discharge, inappetence, and general malaise were observed. These clinical signs, however, were not severe.

Virus was isolated from the nasal mucus as early as one day and as late as nine days after exposure. There was a rise in the H-I titer from 1:8 or less before exposure to 1:256 or 1:512 three weeks after exposure. *Pasteurella multocida* was isolated from each of the calves before and after exposure to SF-4 virus, and in 1 calf there was a pronounced increase in number of organisms isolated after exposure.

PROPERTIES OF THE SF-4 VIRUS

Behavior in Tissue Culture.—On primary isolation in tissue cultures of calf kidney epithelium, cytopathogenic effect (CPE) was first observed at 36 to 48 hours as a scattered focal rounding of individual cells. This progressed to involve patches of cells, with shrinking and degeneration of these patches and their detachment from the glass surface of the tube. This reaction was 75 per cent complete at 96 hours, and complete at 120 hours.

When second-passage tissue-culture fluids were filtered through a Seitz sterilizing filter pad of 0.1- μ porosity and titered in tenfold dilution, CPE was evident in all tubes through the 1:100,000 dilution at 44 hours, and both tubes of the 1:1,000,000 dilution showed 75 per cent destruction of cells at 120 hours. Limiting infective doses

Hemagglutination.—Fluid from infected calf kidney cultures agglutinated guinea pig erythrocytes to a titer of 1:2,048. It also agglutinated bovine erythrocytes and human "O" cells and erythrocytes of 1 of 3 chickens. Agglutination was observed at 4 as well as at 24 to 27 C.

Hemadsorption.—Hemadsorption was demonstrated in tissue cultures as early as 36 hours after inoculation with small amounts of virus. However, an hemadsorption effect was also observed several minutes after undiluted tissue-culture fluids containing large amounts of virus were inoculated into tissue cultures. Guinea pig erythrocytes added to such cultures attached to the virus adsorbed on the tissue-culture cells.

SEROLOGY

Hemagglutination-Inhibition.—Hemagglutination-inhibition titers in naturally infected animals increased from 1:32, 1:64, and 1:256 in serums taken during the acute or early convalescent stage of the disease to 1:512 in serums taken 15 days later. In the case of calf AH-795, in which no signs of shipping fever were observed when virus isolation was made, the H-I titer increased from 1:16 in the early serum to 1:512 72 days later. In artificially infected calves, H-I titers were 0 or 1:8 before exposure to the SF-4 virus and 1:256 or 1:512 21 days later (table 1).

Neutralization.—In preliminary studies, a 1:16 dilution of convalescent serum from calf JT-4 neutralized 3,000 t.c.i.d.₅₀ of SF-4 virus. A 1:10 dilution of this same serum did not neutralize 150 t.c.i.d.₅₀ of IBR virus.

OTHER VIRUSES ISOLATED

Infectious bovine rhinotracheitis virus was isolated from 5 of 8 feeder calves in a mixed group of 20 showing clinical signs of shipping fever. *Pasteurella multocida* was isolated from 8 of 11 of this group.

A further cytopathogenic virus was isolated from 4 of 16 feeder calves in a group of 60 Herefords showing clinical signs of shipping fever. This virus did not possess hemagglutinin for guinea pig erythrocytes, and has not yet been specifically classified. *Pasteurella* organisms (6 *multocida* and 1 *hemolytica*) were isolated from the 7 calves examined bacteriologically.

NORMAL HERDS TESTED

No cytopathogenic agent was isolated from 82 apparently healthy calves on four farms before they were sent to feeder sales. *Pasteurella multocida* was isolated from 42 of these calves representing all four farms.

DISCUSSION

We do not know the significance of SF-4 virus in the over-all etiology of shipping fever of cattle. This likewise is true of other viruses and bacteria, particularly *Pasteurella*. Further studies in this and other laboratories in various areas should provide information necessary to clarify the etiological picture of the disease.

During the course of this investigation, the original isolate of SF-4 virus was submitted to the Laboratory of Infectious Diseases, Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Md., and was there found to be serologically identical to the HA-1 (Myxovirus para-influenza 3) virus isolated⁵ from children suffering from respiratory disease. Amplification of these findings will be found in a paper being submitted for publication.¹

Although our knowledge concerning SF-4 virus is far from complete at this time, we have demonstrated experimentally that the virus is capable of producing a disease syndrome in calves. Moreover, significant antibody titers against SF-4 virus have been demonstrated in the blood serum of cattle located in different herds in Maryland. These findings suggest that this virus is associated with some outbreaks of the bovine respiratory disease complex commonly called shipping fever. Difficulty encountered in isolating the virus would seem

to be related to the comparatively short time that the virus has been found in the upper respiratory tract and the possibility that this virus stage may have passed in many animals before the owner becomes sufficiently alarmed to seek help.

Demonstration of cytopathogenic viruses associated with the shipping fever complex would seem to offer some explanation for failure to produce the disease with *Pasteurella* or other bacteria alone. From our observations, animals infected with IBR virus may show signs indistinguishable from those associated with shipping fever. Perhaps the number of infectious agents isolated from cattle affected with shipping fever will some day be comparable with those isolated from human beings affected with respiratory infections. The frequency with which *Pasteurella* is found associated with shipping fever should be a reminder not to overlook the possible etiological role of this as well as other bacteria. Suggestive evidence of the role of bacteria is the rapid response of many clinically ill animals to initial treatment with large doses of penicillin and dihydrostreptomycin.

As with influenza of man,⁷ shipping fever of cattle may vary from a relatively mild to a severe disease, depending on many circumstances. Some of the most important ones are presence or absence of environmental stress, single- or multiple-agent exposure, degree of exposure, physical condition of the animal, and husbandry practices. Consequently, differences of opinion concerning clinical signs of shipping fever are understandable.

It is postulated that shipping fever is a complex disease because of a mixed variety of etiological factors. Viral agents may cause debilitation or death of host cells, frequently followed by invasion and multiplication of bacteria, some or all of which may be normal flora of the host. It is perhaps not always necessary to have a virus present for manifestation of the shipping fever syndrome, although a virus alone may cause distinct signs of the disease.

The epidemiological and epizootic significance of the serological similarity of strains of Myxovirus para-influenza 3 in cattle and man remains to be established.

SUMMARY

1) A Myxovirus (SF-4) was isolated from nasal mucus of calves showing clinical signs of shipping fever.

a) The suggested classification of SF-4 virus is Myxovirus para-influenza 3, bovine variety.

b) This agent produces cytopathogenic changes in bovine and porcine kidney tissue cultures.

c) It possesses hemagglutinin for guinea pig, bovine, human "O," and chicken erythrocytes.

d) Mild clinical signs of shipping fever were produced experimentally in susceptible calves exposed to an aerosol of second-passage tissue-culture fluids containing the virus.

e) Intranuclear and intracytoplasmic eosinophilic inclusions were observed in bovine kidney tissue cultures infected with SF-4 virus.

f) No cross-neutralization reaction in tissue culture could be demonstrated between SF-4 antiserum and infectious bovine rhinotracheitis (IBR) virus.

2) The virus of IBR was isolated from cattle showing clinical signs indistinguishable from those we associated with shipping fever. Another cytopathogenic virus, not yet classified, also has been isolated from nasal mucus of cattle showing clinical signs of shipping fever.

3) Pasteurella was isolated from approximately 65 per cent of the cattle in herds with shipping fever and 50 per cent of those in herds with no apparent signs of disease.

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Viral Endometritis in Heifers

Three heifers in one herd, in Vienna, developed hydropericarditis. They made a clinical recovery when treated with antibiotics but did not conceive despite hormone therapy. Upon slaughter, all 3 were found to have a subacute superficial endometritis and oophoritis. Based on the clinical, pathological, and therapeutic evidence, the authors believed that the endometritis was of viral origin, probably due to a virus of the psittacosis group.—M. Hidiroglou *et al.* in *Rec. méd. vét.* (April, 1959): 259.

Credit-Card Veterinary Service

It is not surprising, in an age when almost any commodity can be acquired by the use of credit cards, that homeowners who hold certain of these magic cards can dial a single phone number and obtain the services of an impressive list of servicemen and suppliers ranging from carpenters and clock repairmen to rat exterminators and tree surgeons. The issuing agency, in return for a membership fee, sends the "right" man to do the job, guarantees the quality of his work at a fair price, and sends the member a consolidated monthly bill.

Finding that animal hospitals and veterinarians are sometimes on the lists of services advertised by such agencies, the AVMA has indicated, in letters to the agency, that the affiliation of veterinarians with such an agency is in violation of the principles of veterinary ethics.

Because the listing might encourage AVMA members to participate in such a plan, the agencies have been requested, even if no formal arrangement with a veterinarian has been made, to refrain from advertising veterinary service.

Studies of Shipping Fever of Cattle. I. Para-Influenza 3 Virus Antibodies in Feeder Calves

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SHIPPING FEVER is a disease which frequently occurs in beef-type calves following shipment from western ranges to midwestern feedlots. A similar syndrome often follows weaning of calves which will remain on the ranch. Signs of the disease are rhinitis, soft cough, increased respiratory rate, depression, and anorexia. Even with mild infections, these calves may lose a great deal of weight and condition. The death rate from subsequent pneumonia is usually low.

The infectious aspects of shipping fever of cattle are not understood. *Pasteurella* spp., thought for years to be the cause of the disease,¹⁰ have not been shown to have a primary role.⁷ However, the occurrence of these and other bacteria in shipping fever, together with its favorable response to antibiotic and sulfonamide therapy, suggests that bacterial invasion accounts for much of the clinical syndrome. Pleuropneumonia-like organisms isolated from animals with shipping fever have shown little pathogenicity.^{3,8}

Transitory fever occurring with or without other signs of disease has been observed in feeder calves.⁹ This suggested that an epizootic viral infection was present which in some cases altered the defenses of the respiratory tract sufficiently

to allow bacteria, perhaps already present, to produce the clinical disease called shipping fever.

This hypothesis of viral infection gained support when, early in 1958, a virus was isolated in bovine kidney cell cultures from animals with shipping fever.¹⁴ One of us (F.R.A.) isolated another antigenically similar virus from animals with shipping fever during the fall of 1958. These viruses were shown to be serologically identical with a newly discovered respiratory virus from man originally called type 1 hemadsorption virus.¹ This agent is a myxovirus and has now been designated para-influenza 3 virus.²

In connection with studies on shipping fever, serums obtained from calves before and after they had shipping fever were preserved, so that viral antibodies could be studied when respiratory viruses were isolated. The present paper reports serological studies made with para-influenza 3 virus in paired serum samples from calves, with and without clinical shipping fever.

MATERIALS AND METHODS

The calves studied were selected from different feedlots investigated during a three-year period. They were all of beef-type, approximately 6 months old. The groups of calves in these feedlots were quite different in origin, shipment, and feedlot management, but all of the calves had been raised on pasture and had been weaned immediately before being shipped or placed in winter feedlots.

The managerial practices used to handle the different groups were varied, but were representative of those commonly used in feeding calves and provided the usual circumstances under which shipping fever is encountered. Their handling differed from that of ordinary feedlot calves only in that blood samples and nasal swabs were taken, and in some groups daily body temperatures were obtained. In some feedlot groups, individual calves were carefully observed for signs of disease; in others, less critical observations of individuals or of whole groups were made.

Paired serums were collected from certain calves. The initial serum samples were obtained either before the calves went into the feedlot, or when fever (over 104 F.) was first detected. The second

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These studies contribute to the regional research project, Shipping Fever of Cattle (NC44).

sample of the "serum pair" was obtained four to eight weeks after the first. During the interval between samplings, some of the animals had fever, some had signs of respiratory disease, and some showed no evidence of disease.

The serums had been stored at approximately 0 F. for one to 28 months before being tested. Some had been thawed and refrozen several times before being tested.

The serums were subjected to hemagglutination-inhibition (H-I), complement-fixation (C-F), and

perature, a suspension of bovine erythrocytes, standardized in a spectrophotometer to approximately 0.7 per cent, was added to the mixture.

The tests were held overnight at 4 C. The H-I titer was designated as being the highest serum dilution showing complete or incomplete inhibition of agglutination. Most of the serums were not tested beyond the 1:160 dilution; however, in a few where higher dilutions were tested, titers greater than 1:640 were obtained.

Since these studies are based on the H-I test,

TABLE 1—The Antibody Response of Calves to Para-Influenza 3 Virus in the Interval Between Serum Samplings in the Different Shipping Fever Experiments

Experiment and date	No. of calves in feedlot	No. of calves tested	Antibody response		
			Significant titer rise (fourfold or >)	Nonsignificant titer rise (< fourfold)	No titer rise
1. Univ. Nebraska, 1956	239	13	10(76.9%)	1(7.7%)	2(15.4%)
2. Dixon Springs Exper. Sta., 1957	266	29	24(82.8%)	-----	5(17.2%)
3. Dixon Springs Exper. Sta., 1958	223	23	18(78.3%)	3(13.0%)	2(8.7%)
4. Univ. Illinois, 1958	50	20	12(60.0%)	1(5.0%)	7(35.0%)
5. From feeder calf sale, 1958					
Feedlot A	220	11	9(81.8%)	-----	2(18.2%)
Feedlot B	137	27	8(29.6%)	-----	19(70.4%)
Feedlot C	72	13	5(38.5%)	-----	8(61.5%)
Feedlot D	77	6	2(33.3%)	-----	4(66.7%)
Feedlot E	301	18	15(83.3%)	-----	3(16.7%)
Feedlot F	174	18	15(83.3%)	-----	3(16.7%)
Feedlot G	68	13	13(100.0%)	-----	-----
Totals	1,827	191	131(68.6%)	5(2.6%)	55(28.8%)

neutralization tests. There was excellent agreement between the three tests; however, the H-I test was shown to be the most sensitive. The analysis reported here, therefore, is on the results of the H-I tests.

The antigen for hemagglutination was tissue culture fluid from bovine kidney tissues infected with the SF-4 bovine strain of para-influenza 3 virus.^{14b} The complement-fixing antigen was prepared from the "Mills" strain isolated from normal Hela cells in 1954.¹⁵ The neutralization test⁴ used 100 t.c.i.d.₅₀ (50% tissue culture infective doses) of the same antigen used in the hemagglutination tests. The neutralizations were done by inoculating bovine kidney tissue cultures with serum-virus mixtures.

The bovine serums were first treated with a suspension of 25 Gm. kaolin in 100 ml. of physiological salt solution for 20 minutes at room temperature to remove nonspecific inhibitors.¹⁶ The serums were then centrifuged at 1,500 r.p.m. for ten minutes and the supernatant serum decanted. Next, 0.2 ml. of a 50 per cent suspension of bovine erythrocytes was added to each serum and held at 4 C. for one hour with frequent shaking to absorb any isoagglutinins for bovine red blood cells.¹ The bovine erythrocytes were removed by centrifugation.

Serial twofold dilutions of the serums were made and an equal volume of virus, diluted to contain 4 hemagglutinating units of virus, was added. After incubation for one hour at room tem-

perature, the complement-fixation and tissue culture neutralization tests will not be described in detail.

RESULTS

EXPERIMENT 1

The feeder calves in this experiment were raised in three different ranch herds in the Sand Hills area of Nebraska and were brought to the feedlots of the Animal Husbandry Department of the University of Nebraska on Oct. 20, 1956.⁹ The 58 calves from herd A were fed as one group, while 181 from herds B and C were fed and handled as a second group.

Daily body temperatures were taken for ten and 11 days following shipment. Transient fever was found in 14 (24.1%) of the 58 calves from herd A, and in 105 (58.0%) of the 181 from herds B and C. Some of the calves from herd A had mild rhinitis. Eight days after arrival, a number of the calves from herds B and C had signs of shipping fever including depression, soft cough, rhinitis, and anorexia. Most recovered in six days without treatment, but 6 were treated. Two calves died, 1 on the fourth day in the feedlot and the other eight weeks later. Both had lesions of pneumonia judged at necropsy to have been contracted previous to the feeding period.

⁹Supplied originally by Dr. R. Reisinger of the Agricultural Research Service, Beltsville, Md.

The first serum samples were obtained either on the day of arrival or on the first day of fever, four to six days after arrival. The second serum samples were obtained 24 days after arrival. Serums were collected from 10 calves which had a fever during the studies and from 3 which did not.

None of the calves tested had evidence of antibodies for para-influenza 3 virus on arrival or at the time when fever was first observed. When tested 24 days after arrival (table 1), 10 (76.9%) of the 13 calves from which paired serums were preserved had a significant (fourfold or greater) rise in antibody titer for para-influenza 3 virus, 1 had a nonsignificant (less than fourfold) rise in titer, and 2 (15.4%) had no rise in titer. One calf was severely ill and was treated. Three of the calves which had a significant rise in antibody titer had neither fever nor other signs of disease. There was no difference between the calves from herd A and those from herds B and C in antibody response.

EXPERIMENT 2

A group of 266 Hereford calves raised on pasture at the University of Illinois, Dixon Springs Experiment Station, was studied in the station feedlots following weaning in November, 1957. Body temperatures, taken for 11 consecutive days following weaning, disclosed that 104 (39.9%) of the calves had transitory fevers. A few animals had a serous or mucopurulent rhinitis and an occasional soft cough, but no animals required treatment during the first 11 days following weaning. On the last day, however, 17 animals which for several days had had fever associated with mild signs of respiratory diseases were treated with penicillin-streptomycin to forestall the necessity of having to catch and treat them later if clinical signs became more serious. No more cases of respiratory disease developed.

In this experiment, 9 (31%) of the 29 calves had para-influenza 3 virus antibodies on the first test. The serum of 1 calf collected on the fourth day was positive in the highest dilution tested. The serums of 4 calves had antibodies on the fifth day (two high, two low); four had antibodies on the sixth day of the experiment.

The first serum sample was obtained on the initial day of fever; the second, four weeks after weaning. A third sample was

obtained from some of these animals one year later.

Of the 29 calves tested, 24 (82.2%) had a significant rise (fourfold or greater) in para-influenza 3 virus antibody titer and 5 (17.2%) had no titer rise (table 1). Three of these calves were among the 17 in the group treated on the last day of the experiment.

When 11 of the animals were tested one year later, 10 still had H-I antibody titers of 1:20 or greater, but the majority of the C-F titers had dropped below detectable levels. The titers of 5 calves had decreased, but the titers of 5 had remained unchanged.

EXPERIMENT 3

This group of calves was raised on the University of Illinois, Dixon Springs Experiment Station, under circumstances similar to the calves studied the previous year (experiment 2). They were weaned and placed in winter feedlots during the annual roundup in November, 1958. Seventy-five steer calves were fed together in one feedlot. The 148 grade heifers, purebred heifers, and purebred bull calves were given a tranquilizing drug when weaned and kept in feedlots 2 miles from the steer calves.

During the 11 days following weaning, none had any visible signs of respiratory disease but 34 (45.3%) of the 75 steers and 31 (21.0%) of the 148 others had transient fever. Serums were collected from 20 calves from both lots which had fevers during the studies and from 3 which did not.

There was little difference in the results of serological studies between the steers and the other calves. Of 23 calves from both groups, 18 (78.3%) had significant rises in antibody titer; 3 (13.0%) had less than a fourfold titer rise, and 2 (8.7%) had no titer rise (table 1), since their initial titers were as high as the serum dilutions were tested.

Nine (75%) of the 12 heifers had evidence of antibodies against para-influenza 3 virus when first tested (6 of these were tested the first day). Five (45.5%) of the 11 steers had antibody titers when first tested five to seven days after having been placed in the feedlot. Three calves did not have fever, yet they developed significant titer rises during the study. None of the 23 calves tested had a negative H-I titer after five weeks in the feedlots.

EXPERIMENT 4

These calves originated in Texas, and after being trucked for six days, arrived at the University of Illinois, Animal Science Division feedlots in Urbana, on Aug. 26, 1958. During the first 18 days that daily body temperatures were taken, 13 (26%) of the 50 calves had fevers or mild signs of shipping fever but none required treatment. Since it appeared that more shipping fever would not develop, temperatures were not taken after the eighteenth day. However, on the twenty-first day, 6 of the calves became severely ill and were treated; 12 more were treated during the next two days. The attack ended as quickly as it had started. Of the 50 calves, 25 (50%) had fever, or signs of respiratory disease, or both, during the entire period of study.

Paired serum samples were taken from 20 calves, the first at the time that 14 developed a fever; the second, approximately two months later. Six of these calves had no fever or clinical disease. Of the 20 calves, 12 (60%) had a significant (fourfold or greater) rise in para-influenza 3 virus antibody titer, 1 (5.0%) had a twofold rise, and 7 (35.0%) had no rise in titer (table 1).

The initial serum samples were generally negative, but 1 calf had a low serum titer on the eleventh day, 1 on the fourteenth, 2 on the twenty-second day, and 2 on the twenty-fourth day. The results of these tests might well have been negative had the initial serums been obtained at the start of the experiment, as the calves had been six days on the road. Five of the 6 calves which had no fever or clinical disease had significant antibody rises, but 2 of the 20 were still negative when the second samples were obtained.

EXPERIMENT 5

Approximately 2,000 feeder calves and yearlings raised on small farms in southern Illinois were consigned to a feeder calf sale held on Oct. 2, 1958. On arrival they were individually identified with ear tags, weighed, and sorted into sale lots by breed, sex, weight, and grade. Blood samples were taken at random from 200 (25%) of the calves consigned from 27 different herds. Seven feedlots in central and northern Illinois which had received calves bled on arrival at the sale were studied during the next two months.

We visited each of these feedlots two or

three times, but detailed clinical investigations could not be carried out. The clinical observations of shipping fever were made mostly by the owner or his local veterinarian and were less complete than those of previous experiments. The animals having shipping fever were not always identified and recorded by ear tag number, so the number known to have been sick in each feedlot is less than the actual number. This is reflected in the data (table 2).

TABLE 2—Relation of Para-Influenza 3 Virus Antibody Response to Observed Clinical Signs of Shipping Fever in the Calves in Experiment 5.

Feedlot	Significant antibody response (fourfold or greater) in calves		No antibody response in calves	
	With shipping fever	No shipping fever	With shipping fever	No shipping fever
A	1	8	—	2
B	4	4	15	4
C	1	4	1	7
D	—	2	—	4
E	7	8	1	2
F	4	11	—	3
G	13	—	—	—

It was possible to obtain a second serum sample from 106 calves four to seven weeks after the sale. They were not selected on the basis of having had shipping fever or febrile reactions. Sixteen of these calves had low titers of para-influenza 3 virus antibodies at the time of the sale.

Feedlot A.—To this lot of 67 calves bought at the sale were added 153 calves from Virginia one week later. The owner added terramycin to the drinking water for five days following arrival and injected several calves individually with penicillin-streptomycin. Three weeks after the sale, the veterinarian was called to treat several which had not recovered. Eleven serum samples were obtained, 25 days after the sale, when several of the calves had rhinitis and were coughing occasionally. The calves appeared in generally good condition and were gaining weight.

Nine (81.8%) of the 11 calves from which blood samples had previously been taken had a significant antibody titer to para-influenza 3 virus and 2 (18.2%) had no rise in titer (table 1).

Feedlot B.—This feeder bought 137 calves at the sale, moved them to excellent quarters, and put the calves on good feed. Signs of shipping fever appeared on the eighth day and his veterinarian treated 118 with penicillin and streptomycin. When observed

on the fifteenth day, there was considerable coughing, some had rhinitis, but none appeared to be depressed. The next day the veterinarian was again called to treat 6 more calves, 1 was re-treated daily for four days.

The calves were fully recovered when convalescent serums were obtained 26 days after the sale. Since the owner and his veterinarian kept careful records on the cases of shipping fever, at least 19 (70.4%) of the 27 calves previously bled were known to have had signs of shipping fever. Only 8 (29.6%) of the 27 calves studied had a significant rise in para-influenza 3 virus antibody titer; 19 (70.4%) had no titer rise (table 1).

Feedlot C.—Of the 72 calves purchased at the sale and placed on poor pasture and fed fair-quality hay, 8 showing signs of shipping fever were given penicillin and streptomycin by the owner one week after arrival. When visited 11 days after the sale, a few calves had rhinitis and 1 was quite depressed. His veterinarian treated 10 with antibiotics one week later. He had sulfathiazole placed in the drinking water and vitamins A and D supplements added to the feed. Five weeks after the sale, when "convalescent" serums were obtained, the calves appeared to have recovered from the disease, although some coughing could still be heard.

Five (38.5%) of the 13 calves studied had a significant (fourfold or greater) titer rise for para-influenza 3 virus and 8 (61.5%) had no rise in antibody (table 1).

Feedlot D.—Twenty-five Wyoming yearling steers were placed with the 52 calves purchased at the feeder calf sale one week after their arrival in the feedlot. Several calves were treated for "foot rot" by the owner. No signs of shipping fever were observed nor was there evidence of disease in any of the animals when blood samples were taken five weeks after the sale.

Two (33.3%) of the 6 study calves in this feedlot had significant rises in para-influenza 3 virus antibody titers of their serums (table 1), while 4 (66.7%) had no rise in titer.

Feedlot E.—The 91 calves bought at the feeder calf sale were added to 210 calves collected by dealers in Missouri. Many of the latter calves had been through as many as four sales, as evidenced by the sale-tag rings in their ears. Eleven days after arrival in the feedlot, the local veterinarian

treated 4 of the calves previously bled at the feeder calf sale with penicillin and streptomycin.

Two days later, all 301 of the calves were examined individually. Approximately 75 per cent had a fever or mild to severe signs of shipping fever, or both, and were treated. Response to treatment was generally good. When the second serums were obtained from the calves three weeks later (five weeks after arrival in the feedlot), most of the animals showed clinical improvement, but a few were thin and rhinitis was common. Two calves had died and several had been removed to better quarters.

Fifteen (83.3%) of the 18 calves from which the second serum was obtained had a significant rise in antibody titer for para-influenza 3 virus, 3 (16.7%) had no rise in titer (table 1).

Feedlot F.—This feeder bought 174 calves, placed them on apparently unpalatable fescue pasture and poor-quality hay, and injected them with penicillin and streptomycin. Several days later, he reinjected them with antibiotics and a mixed "hemorrhagic septicemia-blackleg bacterin." When visited 19 days after arrival, 3 calves had died and several of the 21 separated for individual treatment appeared to have little chance of survival. The calves considered "well" by the owner had a great deal of coughing and rhinitis.

Seven weeks after the sale, a second serum sample was obtained from the calves previously sampled. Seven calves had died and several others were making a poor recovery. The remainder of the group appeared to be in good condition although weight gains had been slow.

Of the 18 calves from which convalescent serums were obtained, 15 (83.3%) had a significant rise in antibody titer for para-influenza 3 virus and 3 (16.7%) had no rise in titer (table 1).

Feedlot G.—Sixty-eight light-weight calves were bought by a cattle dealer and placed with calves from other sources awaiting resale to feeders. Because of severe shipping fever the sale was prevented, and when visited seven weeks later, 13 of the 21 calves bled at the sale were still available for convalescent serum samples. Two had died and several were in extremely poor condition. They had been given drug therapy by the local veterinarian, but the feed and housing were poor.

All 13 of the animals tested had a significant rise in antibody titer for para-influenza 3 virus (table 1).

DISCUSSION AND CONCLUSIONS

Hemagglutination-inhibition tests served as the basis of these studies. When a comparison of serological tests was made with representative serums, those containing no H-1 antibodies were negative in tissue-culture neutralization tests. Serums with H-1 titers of 1:10 gave variable results in neutralization tests, while those with H-1 titers of 1:20 or greater always contained neutralizing antibodies. Complement-fixation tests were made on all samples, but were not as sensitive as the other tests. A detailed study of the results of the different serological tests will be the subject of a separate report.

On the basis of past data, a fourfold or greater rise in antibody titer is considered significant and indicative of infection.¹⁷ All of the feedlot groups of calves had individuals which showed a significant rise of antibodies to para-influenza 3 virus. There was thus ample evidence of widespread para-influenza 3 virus infection of calves early in the feeding period, *i.e.*, during the period in which shipping fever occurs.

In the first four experiments, serums were obtained from 73 of the 85 calves because they had elevated temperatures or signs of shipping fever, or both. Of the 12 calves which had neither fever nor signs of disease, 11 had significant titer rises for para-influenza 3 virus. Subclinical infection was, therefore, common. The selection of study calves in experiment 5 was random and had no relation to signs of disease.

While these studies show that infection with para-influenza 3 virus is common in feedlot cattle, they do not provide the type of information necessary to prove that this virus definitely causes shipping fever. This was largely due to a lack of definitive criteria of clinical infection. Even with the most critical observations, mild cases were undoubtedly missed. The fever is transient,⁹ usually being observed for only one day. It is probable that fever occurred in some calves during the 24-hour interval between the taking of temperatures and thus was missed. The use of 104 F. as the minimum was an attempt to make certain that temperature rises caused by handling, etc., would not be interpreted as fever. While

this criterion may be higher than necessary, examination of the accumulated data has not revealed a more significant lower temperature.

The other criteria were also not entirely definitive since mild signs of disease are difficult to observe under field conditions. From the experience in respiratory disease in man one would expect a large number of subclinical cases in a viral disease of this type. In some of the feedlots, the clinical data on individual calves were sketchy due to lack of detailed observation, inability to read ear tag numbers in the feedlot, and failure to keep careful records of sick animals even when this would have been possible.

Most of the calves studied had no detectable antibodies for para-influenza 3 virus when first sampled. Had serums been obtained from all calves on arrival in the feedlots, instead of on the first day of fever, the number of initial serums giving negative results would probably have been higher. This general absence of antibodies for para-influenza 3 virus, in spite of the obvious susceptibility of calves to infection, may indicate a low infection rate in adult cows in the herds of origin, lack of contact with man, lack of predisposing "stress" in calves until weaned and shipped, or perhaps that seasonal factors influence the prevalence of the infection.

Since this virus was first described as occurring in man, the epizootiology of the disease becomes especially interesting. Which species is the natural host for the virus? The virus may be widespread in nature. It is significant that beef calves are pasture-raised and that weaning, shipment, and handling in stockyards and feedlots often constitute their first close contact with man, and that usually with many different individuals.

Since respiratory disease is most common in recently shipped cattle, "stress" factors operating during this period may alter a delicately balanced host-parasite relationship with resulting disease manifestations. The viral infection may, however, depend solely on the opportunity to be spread to susceptible animals. Also, clinical shipping fever, or the severity of the resulting disease, may depend on "stress" factors and the activity of respiratory bacteria.

The high susceptibility of calves to infection and lack of adequate clinical

definition of infection indicate that vaccination experiments may be essential to demonstrate the importance of this virus in the cause of shipping fever. This can probably be easily done since formalinized vaccines for other myxoviruses have been shown to have immunizing ability in man.⁶ Calves with naturally occurring antibodies would be useful in similar experiments.

The results in feedlots B, C, and D proved to be most interesting (table 1). The data on animals in feedlot B seem especially significant because of the accurate records. While 29.6 per cent of the calves had a significant rise in antibody titer to para-influenza 3 virus, most of the calves which had shown clinical shipping fever had no rise in antibody titer to the virus (table 2). This suggests a predominant concurrent infection with an agent other than para-influenza 3 virus during the shipping fever epizootic.

In the study of respiratory diseases of man, many agents have been shown to contribute to a broad clinical syndrome.^{10,11} The present investigations strengthen the earlier hypothesis that there may be similarly, several etiological factors in respiratory infection in cattle.⁹ Infectious bovine rhinotracheitis virus¹² and bovine enteroviruses¹³ have already been associated with respiratory syndromes and would perhaps be capable of inciting a viral infection associated with certain cases of shipping fever.

While these experiments do not provide positive evidence that para-influenza 3 virus is a primary cause of shipping fever, the data are not inconsistent with a hypothesis that this virus was the primary cause of a significant proportion of the disease observed among the animals studied.

SUMMARY

Shipping fever investigations were carried out in 11 groups of feeder calves during a three-year period. Serums were obtained from some of the calves early in the feeding period and again three to seven weeks later. The serums were tested for the presence of antibodies for para-influenza 3 virus. It was found that:

1) All groups of feedlot calves studied during the three-year period had animals which developed significant (fourfold or greater) antibody titer increases to para-influenza 3 virus.

2) Of 191 calves studied from all groups, 131 (68.6%) had significant antibody titer rises.

3) This indicates widespread infection of feeder calves with para-influenza 3 virus during the time when shipping fever occurs.

4) A definite cause-and-effect relationship between this virus and shipping fever could not be established due to the inherent difficulties in evaluating mild and subclinical cases of shipping fever.

5) The data do not, however, preclude the possibility that para-influenza 3 virus was the primary infectious agent responsible for the majority of the cases of shipping fever observed.

6) The results in three feedlots suggest that another infectious agent may have been the predominant primary cause of the illness observed.

A definitive experimental approach to determine the importance of para-influenza 3 virus in the cause of shipping fever is discussed.

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New Brucellosis Testing Method

A new method for improving the testing of range cattle for brucellosis has been approved for use starting this summer in the western cattle states.

The new system, based on blood-testing dry and cull cows on the way to or during commercial slaughter, rather than testing animals on the range, provides an inexpensive, convenient method for screening beef herds for brucellosis. It is expected to help range states maintain modified certified-brucellosis area status more easily than they have in the past. The fight against brucellosis is a federal-state cooperative effort.

A modified certified-brucellosis area is one in which not more than 1 per cent of the animals and not more than 5 per cent of the herds are infected and certification is for three years. Continued routine testing makes recertification possible, but for beef producers it means, at present, rounding up and retesting at least a fifth of all herds in a certified area every three years.

Under the new plan, a range county can be recertified if at least 15 per cent of the breeding cows going to or at slaughter centers are blood-tested during a three-year period, and if other requirements of certification are met. The actual procedure involves tagging each animal (with a thin, plastic tag) to identify her state, county, and herd of origin. When reactors are found, it will be possible to trace the herd of origin quickly and take steps to eliminate infection from the herd.—*U.S.D.A. News Release, May 11, 1959.*

Brucellosis on Malta

Malta fever had been a well known disease of man on Malta Island long before it was called brucellosis. Brucellosis is still present in about 100 herds of cattle on Malta. Two thirds of the infection is due to *Brucella abortus* and the others to *Brucella melitensis*. Only *Br. melitensis* has been isolated from goats, sheep, and pigs. This infection is still present in approximately 20 per cent of the goats and 1 per cent of the other two species. A campaign for the control of brucellosis on the island is underway.—*Brit. Vet. J. (March, 1959): 96.*

Integration Troubles

With broilers and eggs having sold at "rock-bottom" prices in recent months, two popular notions about farm integration have been "exploded." It proved that "fewer and better managers—are still no guarantee against overproduction" and that contract prices are "no guarantee of . . . security for the farmer" because the "contractor might be out of business" in a year, or be unable to produce a "contract you can live with."

"Integration has become such a dirty word that there has been a mad scramble to fix the blame for it."

In other areas, integration in swine raising may do well "in the South but not in the corn belt [where] farmers have hog management know-how, capital, and raise much of their own feed." Likewise, the dairy cow pools will not eliminate the good dairyman if he has "a good market."—*Farm J. (July, 1959): 33.*

Integration carries only a minor threat to the efficiently operated family farm. It does open doors for production and marketing efficiency but alert farmers are already doing many of these things and can adopt others. There is no advantage in integrating crop production except for special fruit and vegetable crops. Also, studies at Purdue University show that nearly all of the proposed livestock production economies are possible in the typical farm-size operation. Costs per unit can not be lowered much after the volume is 20 to 30 sows, 75 to 100 steers, or 1,000 laying hens. Many new integration ideas will be presented, but many will fail.—*Wallaces Farmer (May 16, 1959): 12.*

The Evolution of Laboratory Animal Medicine in the United States

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THE CARE and management of laboratory animal colonies recently has gained acceptance as a specialized discipline, an important adjunct to biological and medical research.⁴ Although the veterinarian is particularly well equipped to seek a career as a specialist in laboratory animal medicine and to provide leadership in this discipline, only recently has he entered this field. In fact, prior to World War II, veterinarians had almost no opportunity for work with the common laboratory species.

However, much of the progress in the field since 1945 is due to the active participation of individuals trained in veterinary medicine. For example, veterinarians have played an important role in advancing the concept that laboratory animals can be raised free of their common pathogens.^{7,8} As a result, the quality of these animals is improving rapidly as commercial breeders apply these newer approaches to production. The purpose of this paper is to trace the evolution and current status of laboratory animal medicine insofar as these relate to the veterinary profession.

ORIGIN OF LABORATORY ANIMAL CARE IN THE UNITED STATES

Laboratory animals have been used in American research institutions since the 1850's when Professor John Call Dalton, a physician, introduced live demonstrations into his physiology course at the College of Physicians and Surgeons in New York.¹⁰ Dalton had learned some of the techniques of animal experimentation while visiting Claude Bernard's laboratory at the College of France in Paris.¹⁷

By the end of the nineteenth century, most American scientists were convinced of the value of animal experimentation.¹¹ However, the number of animals used was small and no special attention was paid to their care, maintenance, and diseases. This

is indicated by the absence of published information on this subject prior to 1900. Each investigator simply made whatever arrangements he felt were appropriate every time he performed animal experiments.

From 1900 to 1920, no adequate facilities existed for the laboratory species in medical institutions.¹³ Funds for animal experimentation were severely limited. Research workers converted unused chemical hoods into mouse-breeding pens, set up animal rooms in laboratory basements or on the roof, and frequently used their own offices for animal housing. Epizootics were common, and experiments often were disrupted by the inability of investigators to obtain healthy animals and maintain them under uniform environmental conditions. The requirements of proper animal husbandry were not yet well understood. Further, since investigations in human and animal diseases were regarded as completely separate entities, there was no profitable communication among the professional workers in these fields.

Recognition, by 1920, of the essential unity of animal and human infectious disease research further stimulated the use of animals as research tools, one result being an increase in published material about the laboratory species.³ In 1928, the diseases of rats, mice, guinea pigs, and rabbits were reviewed.¹² In 1931, a complete volume was devoted to the pathology of laboratory animal diseases.¹⁰ Late in 1944, the New York Academy of Sciences sponsored the first conference on Animal Colony Maintenance and the proceedings were published.⁵ This conference, which covered diseases, nutrition, genetics, breeding, housing, environment, and administration of animal colonies, may well be said to mark the founding of the discipline of laboratory animal medicine. It is of interest that not a single veterinarian contributed a paper at this pioneering meeting.

Between 1920 and 1945, a number of excellent animal colonies and animal care

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programs developed. The Jackson Memorial Laboratory mouse colonies in Bar Harbor, Maine; the primate colony at the Carnegie Institution of Washington in Baltimore; the Wistar Institute rat colony in Philadelphia; and the Whipple-Robscheit Robbins dog colony at the University of Rochester are four examples.

During these years, primarily by trial and error, the research workers concerned with these colonies had gained the experience necessary for successful maintenance of the various species. However, there were more instances in which the investigator's experience was inadequate, and his trial and error method resulted in poor animal care with its sequellae of disease and loss. To make matters worse, there were few professionally trained people available for consultation; certainly the veterinary profession at that time had little direct interest or concern with animal colony problems.

An interesting feature of animal experimentation during this period was the dependence of the research workers, inexperienced in the care of laboratory animals, on their "caretakers," "dieners," or "animal men." An effort was made to employ people with farm experience who "knew all about animals." The majority of these employees had little formal education and, unfortunately, without proper guidance, they generally were unsuccessful in dealing with the problems which inevitably arose. Nevertheless, in the years after 1920, a number of animal caretakers with this type of background acquired a wealth of practical experience with the laboratory species, and became truly indispensable mainstays in their respective institutions. To this day, laboratories having such personnel on their staffs consider themselves fortunate.

ENTRY OF VETERINARIANS INTO THE FIELD

Perhaps the main reason why veterinarians did not participate in the early development of laboratory animal medicine is that few job opportunities existed for them in medical institutions. The Mayo Foundation apparently was the first American research laboratory to employ a veterinarian specifically to direct the management of animal colonies.¹³ In 1915, Dr. Simon D. Brimhall took charge of the Mayo animal quarters. He was succeeded, in 1922, by Dr. J. G. Hardenbergh; and in

1927, by Dr. C. F. Schlotthauer. Dr. Schlotthauer retired in 1958.

Other veterinarians undoubtedly were employed in medical research institutions during this period, but not expressly to supervise the operation of animal colonies. In 1910, for example, the Department of Pathology at Harvard University employed a veterinarian for research on sporotrichosis.¹⁴

Dr. K. F. Meyer has been associated with the University of California for more than 40 years. The tremendous breadth of his activities, fortunately, has included a direct interest in laboratory animals; and he has contributed significantly to the understanding of infectious diseases in the laboratory species.^{12,15}

During and immediately following World War II, a large number of pharmaceutical companies expanded their research and development programs. Veterinarians were employed to direct the enlarged animal facilities serving these programs. Additionally, a number of military veterinarians were assigned to army medical research units with responsibility for the animal colonies.

The antivivisectionist threat prompted a significant number of medical schools and research laboratories to employ veterinarians between 1945 and 1948. In Chicago, for example, the University of Chicago, Northwestern University, the University of Illinois, and the Hektoen Institute for Medical Research employed veterinarians during this period. It soon became apparent that these veterinarians could also make tangible contributions to the solution of other animal colony problems. This small nucleus in Chicago began to meet regularly to discuss questions of common interest. Dr. N. R. Brewer, of the University of Chicago, was the dean of this group.

The 1945 meeting of the New York Academy of Sciences had not been followed up and there still was no regular way for interested workers to exchange information and to advance their own training. Accordingly, the Animal Care Panel was founded in 1950, and national meetings have been held annually since that time. The Panel has stimulated critical interest in every phase of laboratory animal care, and its discussions are published in the annual *Proceedings of the Animal Care Panel*, a quarterly since 1957. In 1952, the National Academy of Sciences-National

Research Council organized the Institute of Laboratory Animal Resources to assemble and disseminate information about the national supply and users of laboratory animals.⁹

The American Veterinary Medical Association formally "recognized" the field in 1952. At that time, a Committee on the Medical Care of Laboratory Animals was appointed, and at subsequent national meetings of the AVMA, scientific sessions concerning the laboratory species were organized. Late in 1956, the Committee was disbanded, and a specialty board, the American Board of Laboratory Animal Medicine, was created in its place.¹ Thus, in a few short years, the veterinary profession has assumed a position of leadership in the field.

Several other important factors have contributed to the increase in the number of animal care specialists. Financial support of research in the medical sciences has increased markedly, and almost every laboratory has been able to modernize or expand its research facilities, including animal quarters. Also, institutions now are accepting direct responsibility for providing adequate housing and care for animals. The research worker no longer must bear this responsibility alone. Finally, the number of animals used has increased astronomically. It has been estimated that 25,000,000 mice, 9,000,000 rats, 900,000 guinea pigs, 500,000 rabbits, 250,000 dogs, 250,000 monkeys, and 100,000 cats are used annually at the present time in American research institutions.²

These factors naturally have led institutions to seek professional guidance in providing for animals; and they have turned to the veterinary profession as the logical source of this guidance.

CURRENT STATUS OF VETERINARIANS IN LABORATORY ANIMAL MEDICINE

When animal colony directors are employed today, they are expected to be expert in the diagnosis, treatment, and control of laboratory animal disease. An understanding of animal colony organization, administration, and design is required. Familiarity with the husbandry and nutritional requirements of the laboratory species is essential. It is often necessary that these specialists instruct other research workers and laboratory personnel in techniques of animal experimentation; and that they advance

knowledge in their field of special interest through appropriate research.

From 1945 to 1950, on-the-job self-instruction was the only training method available to the few veterinarians in the field. Undoubtedly, this approach will remain an important means of achieving competence. However, the opportunities for supplemental instruction are improving. Some veterinary schools now invite active workers each year to lecture on the major problems in the field,³ and increasing mention of laboratory animal disease problems is made in existing course offerings in the veterinary curriculum. A modern text covering the diseases of laboratory animals is in preparation.⁴ Thus, new graduates entering the field will at least have an introduction to the major disease problems they may encounter.

At the graduate level, the Armed Forces Institute of Pathology is making an important contribution to training by its sponsorship, annually since 1954, of a one-week course, "Pathology of the Diseases of Laboratory Animals," the proceedings of which are published in part.¹⁰

In the fall of 1959, the Walter Reed Army Institute of Research will offer a two-year postgraduate program in laboratory animal medicine for veterinarians in the armed services.²⁰

Civilian specialists must still rely primarily on their own initiative to gain the necessary competence. However, it may be expected that additional comprehensive training programs in this field will become available.²²

CAREER OPPORTUNITIES IN LABORATORY ANIMAL MEDICINE

At least 125 veterinarians presently are employed as specialists in laboratory animal medicine. Virtually all of these positions have been established since 1945. About 25 per cent of the medical schools in the United States now have veterinarians on the staff.[†] Within the next ten-year period, every medical school may well have on its faculty a specialist in laboratory animal medicine. Additional positions should become available in other biological re-

[†]For example, the University of California and University of Illinois schedule a series of lectures each year in the field of laboratory animal medicine.

²²A veterinary research fellowship for the investigation of laboratory animal diseases was recently established at the Berg Institute, New York University-Bellevue Medical Center.

search institutions, in pharmaceutical companies, and in industrial organizations.

Finally, state health departments should provide an increasing number of positions in this field. For example, a veterinarian in the California State Department of Public Health administers the state law on the care and use of laboratory animals.[†] This individual is available to public and private laboratories for consultation on animal colony problems. In addition to administrative and regulatory duties, he does research and directs the department's animal colonies.

It may be estimated that a potential exists for at least 300 new positions in those institutions using animals extensively. Whether these positions will, in fact, be created and filled by qualified veterinarians within the next ten to 15 years depends on the vigor with which those already in the field demonstrate and dramatize the true value of the laboratory animal specialist. Clearly, the emphasis should be on attracting academically qualified personnel because laboratory animal medicine is an academically oriented specialty.

Ideally, the number of available positions and qualified applicants will increase simultaneously. As the concept grows that the laboratory animal specialist is simply another member of the modern research team, progressive research institutions will find it necessary and desirable to employ such personnel. Those in the field must continue to demonstrate that high-quality research demands proper care for the laboratory species; and these objectives can best be achieved with the guidance of appropriately trained professional personnel.

SUMMARY

The origin of laboratory animal care in the United States is reviewed. Only since 1945 have veterinarians entered the field of

laboratory animal medicine in significant numbers. A potential exists for at least 300 new positions within the next ten to 15 years. The laboratory animal specialist should be academically oriented as an essential member of the modern research organization.

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[†]The following medical schools employ veterinarians as animal colony directors: University of California (Los Angeles and San Francisco); University of Washington; University of Rochester; State University of New York (Downstate and Upstate Medical Centers); Albert Einstein School of Medicine; University of Chicago; Northwestern University; University of Illinois; Bowman Gray School of Medicine; Medical College of South Carolina; Vanderbilt University; University of Louisville; University of Wisconsin; Harvard University; University of Florida; University of Miami; University of Missouri; State University of Iowa.

[‡]This is a permissive law passed in 1952 with the active support of the medical, dental, veterinary, and allied professions. It provides for the licensing of all laboratories in the state using animals, and outlines guiding principles of animal care.

Skin Grafting in the Horse

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THE TREATMENT of wounds below the knee and hock of the horse presents many problems. In addition to wire cuts, lacerations from loading and unloading horses in trucks and trailers are common. Horses have a relatively tender skin which is frequently injured because of their natural inclination to use frantic efforts to disengage themselves from entanglements. Lacerations on the body may heal rapidly but the skin below the knee and hock is relatively avascular and is tightly adherent to the underlying structure. Motion is detrimental to healing, and contamination and irritation is difficult to avoid. The healing process is frequently complicated by exuberant granulation or massive, dense, keloid-like formations with poor healing tendency.

The success attained with skin grafting in man²⁻⁶ stimulated an effort to apply these techniques to the horse. Since the project was initiated, in 1954, 61 grafts have been attempted on experimental animals and clinical subjects.

EXPERIMENTAL PROCEDURES

The techniques used included sliding flap, small deep grafts, pinch grafts, tunnel grafts, split skin grafts, and full thickness grafts.

Sliding Flap.—This is a simple procedure used principally on small lesions. A flap of skin from an adjacent area is undermined. It is then rotated or advanced to cover the defect. Torsion of the flap must be avoided since the flap depends largely on the blood supply coming through the attached portion.

This procedure is generally at least partially successful. The most common unfavorable development is necrosis of a portion of the distal end, either from an inadequate blood supply or excessive pressure from a tension suture. To avoid excessive tension, it is helpful to cut the flap one third larger than the recipient

area to compensate for the shrinkage of the flap and enhance marginal union.

Small Deep Grafts.—These were occasionally used on infected lesions around joints where immobilization and bandaging was difficult. This procedure consists of implanting small fragments of skin (4 to 8 mm. in diameter) deep in the granulation tissue by using small forceps or a probe. Some were washed away by hemorrhage. Eventually, tiny islands of epithelium appeared over the surface of the granulation tissue. The grafts were slow to develop, and if there was a tendency toward exuberant granulation, the mass was sometimes considerably enlarged before the islands from the seeded areas of the proliferating epithelium united. There were no hair follicles in this type of graft.

Pinch Grafting.—Pinch grafting, which consists of transferring a number of small disks of skin to the recipient area, was also used. The donor area was shaved and anesthetized. A needle was then thrust into the skin and raised to elevate a cone of skin which was excised with a scalpel. This freed a small disk of skin of full thickness in the center with diminishing thickness at the periphery. A number of these sections were simply placed on the recipient area and bandaged in place.

These disks usually became adherent in a few days, then they appeared to loosen and come away with the bandage. Microscopic examination revealed, however, that a few cells did survive on the recipient area and contributed slightly to the healing process.

Tunnel Grafts.—These were attempted by creating several tunnels through the base of the exuberant granulations. Through these tunnels were threaded thin strips of skin.¹ After five to ten days, the overlying granulation tissue was removed. This procedure was attempted only three times, but the results were unsatisfactory. The failures were possibly due to faulty technique.

Split Skin and Full Thickness Transplants.—These transplants were given the

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most attention. Initially, a spotted horse with white legs was used for experimentation. Pieces of skin of various sizes were removed from the legs. Then, using different procedures, donor skin was taken from pigmented areas on the body and transferred to the lesions on the legs (fig. 1-5). This was done primarily to determine the thickness of skin most successfully transplanted, the survival rate of hair follicles, and the ability of the new graft to form pigment, and to develop a satisfactory procedure for aftercare.

Full Thickness Transplants.—These were made either from the loose skin of the brisket or from an area posterior to the axilla. The skin that was removed was freed of all subcutaneous fat before grafting. The donor area was then sutured.

Split Thickness Transplants.—These were attempted by using a dermatome to remove sections of skin varying in thickness from 0.01 to 0.06 inch. These were removed from the ventral surface of the abdomen.

The grafts were applied to wounds of various diameters on both experimental animals and clinical subjects. Fresh, as well as granulating wounds (fig. 6-11), were grafted. The recipient area was cleansed and bandaged with an antiseptic pack one day before grafting. At the time of surgery, if granulation tissue was present in excessive amounts, it was removed to a level slightly below the surrounding skin. In wounds of long standing, it was necessary to remove the hypertrophied ridge of dense tissue surrounding the wound. Hemorrhage was controlled by using hemostats on the larger vessels and spraying the wound with 1:10,000 adrenalin solution or a 1 per cent solution of phenylephrine hydrochloride (Neo-Synephrine HCl*). When nearly all oozing hemorrhage had stopped, topical thrombin was

applied to completely control hemorrhage. Sutures (interrupted nylon) to hold the graft were placed about $\frac{1}{4}$ inch apart.

Various antibiotic and sulfonamide preparations were applied to the edges of the graft and a wet pack was bandaged over the area. The pack was soaked daily with physiological saline solution and replaced every few days. The sutures were removed in six to ten days and the bandaging was discontinued in about 14 days. The period of bandaging depended partly on the reaction of the lesion and the susceptibility of the delicate graft to trauma.

RESULTS

Even the most satisfactory grafts lost their character when transferred. Within a matter of minutes, fibrin would seal the two surfaces together. However, on about the third day, the surface of the graft would begin to show discoloration and degeneration of the superficial layers that were not receiving nutrition (fig. 3). After about six to ten days, the necrosed superficial layers would separate and come away with the bandage. Sometimes it would appear that the entire graft had been rejected. Within a few more days, however, islands of epithelium would become distinct over the grafted area. These would continue to appear and enlarge until the area was covered with intact, delicate pink epithelium.

If the bandage was allowed to become dry, the necrosing superficial layers formed a hard, dry scab which had a tendency to adhere to and loosen the underlying viable layers. When the bandage was kept moist, the superficial cells macerated and did not dislodge the deeper and viable layers.

Although there was some variation, about four weeks were usually required for pigmentation of the graft to appear. Fine hairs began to appear in four to six weeks.

With even the best results, the hair coverage was relatively sparse and often the

*Neo-Synephrine HCl is produced by Winthrop Laboratories, Inc., New York, N.Y.

Legends for Pictures on Opposite Page

Fig. 1—Experimental free transplants of pigmented skin to a nonpigmented area of the metacarpal region of a horse. The three sections were 0.025, 0.045, and 0.060 inches in thickness.

Fig. 2—The three thicknesses were used to allow comparison of pigmentation and hair follicles in both the donor and grafted areas.

Fig. 3—After four days, the superficial layers of skin showed degeneration.

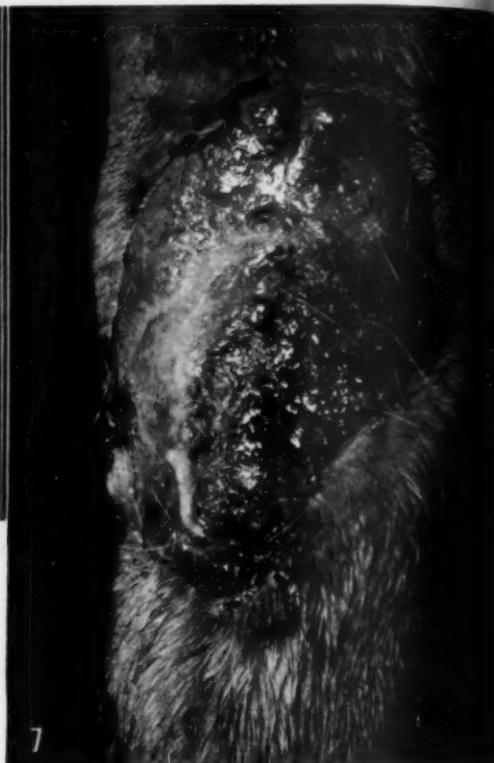
Fig. 4—Five months later, pigmented hair sparsely covered the grafted area.

Fig. 5—The shaved area revealed the outline of pigmentation and degree of contraction that had occurred.



Fig. 6—Split thickness transplants were attempted on lesions from which exuberant granulations had been repeatedly removed. Fibrotic enlargement of the leg of this horse was apparent.

Fig. 7—Close-up of transplant shown in figure 6.



hairs remained shorter than the surrounding area. Because of the lack of functional sebaceous glands, the grafted skin remained scaly for months (fig. 10).

DISCUSSION

A graft is actually a parasitic structure until it establishes its own blood supply. Until that time, it must be maintained by osmosis and diffusions from the fluids bathing its inner surface from the recipient bed. It is important that the bed be smooth so that contact is complete. The seal of fibrin is rapidly infiltrated with fibroblasts and leukocytes. Soon capillary buds appear to anastomose with the vessels in the graft.⁴

In this study, it was not possible to perform free skin transplants that would so closely match the surrounding skin that no blemish would result. However, it was possible to effect rapid covering and healing of lesions.

It appeared that transplanting was more difficult with full thicknesses of skin than with split skin 0.01 to 0.03 inches thick. The thinner sections suffered less necrosis and yet transferred a surprising number of hair follicles. A sparse hair coat was

Legends for Pictures on Opposite Page

- Fig. 8—Four days after grafting, the superficial cells were undergoing degeneration. An opening was made in the graft over a suppurating fistula.
- Fig. 9—Eleven days after grafting, the superficial portion of the graft necrosed and was discarded in fragments. Surviving epithelial cells began to appear over the surface.
- Fig. 10—Twenty-five days after surgery, the graft had undergone considerable contraction but remained scaly. Pigmentation was appearing.
- Fig. 11—Six months after grafting, the clipped leg revealed partial hair covering and further contraction of the graft. The swelling of the leg began to reduce with the application of the graft.

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11

also left on the donor area. Contraction of the graft continues for months, eventually reducing the size of the blemish.

It appeared that large wounds should not be grafted immediately. The attempt should be delayed until the lesion is filled with granulation tissue. During this time, contraction will rapidly reduce the diameter of the wound. After the rate of contraction has diminished, the graft may be applied. However, excessive delay results in greater fibrotic enlargement of the area. As long as the wound is open, the surrounding inflammatory edema persists with eventual fibrotic changes.

SUMMARY

1) It is possible to accomplish free skin transplantation on the horse.

2) Such grafts hasten the healing process and minimize blemishes. The resulting graft, however, is of altered character and usually remains obvious.

3) The amount of aftercare required and the somewhat variable results have limited our use of the procedure to certain selected cases that do not heal by conventional handling and where minimal scar formation is especially important.

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Alveolar Periostitis in Horses

Of 7,740 horses hospitalized at the surgical clinic, since 1931, at Vienna, 82 (1%) were affected with alveolar periostitis or dental fistulas. Undesirable sequelae frequently followed extraction of molars in young horses. Therefore, when the tooth is firmly fixed and appears normal, it is not

removed. Instead, the periapical exostoses of the mandible is opened with a chisel and the diseased bone is removed with a curette. Bilateral mandibular exostoses, corresponding to roots of the first two premolars and occasionally the first molar, are often present without inflammation. They usually occur at 2 to 4 years of age and disappear before 8 years of age. Dissection and radiography have shown that these are usually sterile, enlarged dental sacs of the growing teeth which are temporarily prevented from eruption by other teeth.—E. Eisenmenger in *Wein. Tierärztl. Monatsch.* (Jan., 1959): 51.

Artificial Insemination of Swine

An analysis of insemination experiences, in 1957 in Britain, indicates that simulated natural coitus may be a factor in stimulating hormonal activity which advances ovulation in swine to coincide with service. This may be effected by a simulated mounting of the sow as well as by cervical stimulation with the catheter if applied at the critical time. The fecundity seemed greater at the first estrus after weaning than at subsequent periods, especially if the first heat occurred within five days of weaning. The optimal time for breeding is probably toward the end of the first day of estrus.

The percentage of pregnancy obtained by four experienced operators was 47 for sows and 34 for gilts. This could be because young gilts may fail to ovulate up to the third or fourth estrous period. Of the 993 females that did not farrow, 72 per cent returned to heat in three weeks, 18 per cent in about six weeks, and about 6 per cent at nine weeks.—D. H. L. Madden in *Vet. Rec.* (March 21, 1959): 227.

Surgery as an Aid to Metastases

Many believe that surgical operations may encourage development of metastases in patients with certain types of cancer. This could be because operative stress can affect adhesion between cells and this lack of adhesiveness is known to be associated with a low calcium level. Since surgical trauma produces a local or systemic demand by the tissues for calcium, the changes in the calcium concentration may favor metastases. The postoperative calcium metabolism may also be associated with increase in parathyroid activity.—*Nature* (Nov. 29, 1958): 1505.

Some Observations on the Use of Synthetic Oxytocin in Sows

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OXYTOCIN (Syntocinon*) was synthesized in 1953 by du Vigneaud,^{5,6} who received the Nobel prize for this work. Others⁷ later devised a method for large-scale production of this polypeptide compound. A careful pharmacological study⁸ was followed by intensive trials and successful use in human obstetrics.^{1,2,4,7,9-13} The present investigations were undertaken to show the effect of a synthetic oxytocin in sows.

The experiments were conducted with Duroc sows 1 to 3 years old. None showed any sign of illness during the whole gestation period. The experiments included studies of the effect of this oxytocin on: (1) secondary uterine inertia; (2) the uterus after parturition; (3) the milk flow of normal sows; (4) sows that suffered from a lack of letdown; and (5) the dose necessary to take milk samples.

The studies were carried out with a clear solution of the drug containing 10 international units per milliliter. It was injected either intramuscularly into the lateral muscles of the thigh (ham), or intravenously into an ear vein (especially with multiple injections) with an 18-gauge needle, or into the jugular vein with a 17- to 18-gauge needle 6 inches long.

EFFECT ON SECONDARY UTERINE INERTIA

A 2-year-old sow farrowed the first 3 pigs of her third litter at 35-minute intervals. During the next few hours, no pigs were delivered and the abdominal contractions became progressively weaker. Five units of the oxytocin was injected intravenously and the fourth pig was born within two minutes. Seven more live pigs followed at intervals of approximately five minutes. The twelfth pig which was expelled after a 35-minute interval was dead.

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*Sandoz Pharmaceuticals, Hanover, N.J.

The authors thank Drs. J. W. Kendrick and G. H. Threlen, Department of Clinics, School of Veterinary Medicine, Dr. H. Heitmann and Mr. J. F. Moore, Department of Animal Husbandry, University of California, Davis, and Mr. H. Althouse, Sandoz Pharmaceuticals, Medical Department, San Francisco, for their assistance and cooperation.

In a 3-year-old sow delivering her fifth litter, weak abdominal contractions were observed for 85 minutes following the birth of the third pig. Twenty units of the drug was given intramuscularly, and strong abdominal contractions began six minutes after administration. The fourth pig, delivered 18 minutes after the injection, was dead. Seven live pigs were then delivered at intervals of three to 13 minutes. The twelfth pig, expelled 19 minutes later, was dead.

EFFECT ON THE UTERUS AFTER PARTURITION

A 3-year-old sow that had farrowed her fifth litter without assistance was used to show the effect of synthetic oxytocin on the uterus 30 hours postpartum. The uterus, exposed by laparotomy, was flaccid and dark red (fig. 1). Three minutes after an intravenous injection of 5 units of this oxytocin, the uterus was strongly contracted and ischemic (fig. 2).

EFFECT ON THE MILK FLOW OF NORMAL SOWS

These observations were made on 7 sows seven to 12 days after farrowing. The sows were normal and the size and growth rate of their litters indicated that their milk production was normal. Milk production in sows 1 and 2 was determined by weighing the pigs before and after nursing. The production in sows 3 and 4 was determined in the same way prior to treatment, but after the treatment, the sows were hand milked by four to six persons simultaneously and the amount of milk measured. The results are tabulated (table 1).

Sows 5, 6, and 7 were treated intravenously with synthetic oxytocin for six consecutive milkings. Milk produced in the first milking was sucked by pigs. In the following five milkings, the hand-milking procedure was used and the milk measured. When the sow nursed the pigs, the injection was given relatively fast; if the sow was to be milked by hand, the injections were made more slowly in order to maintain the milk pressure as long as possible

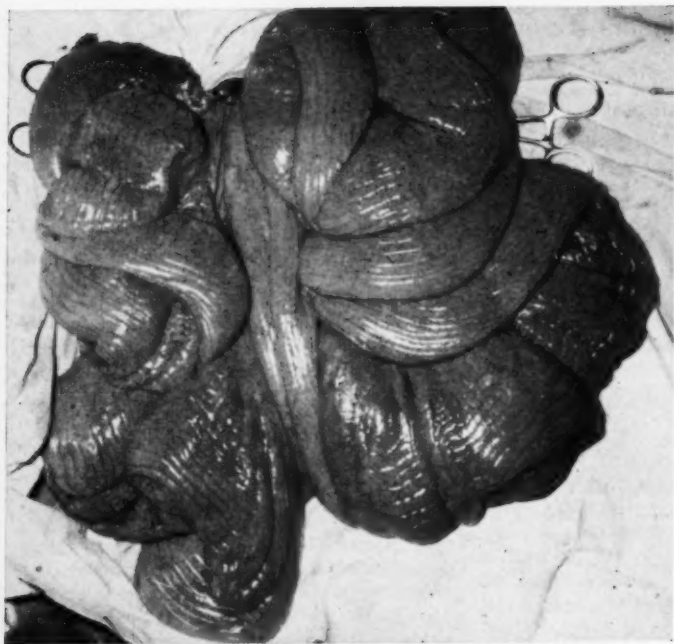


Fig. 1—Uterus of a sow
30 hours postpartum.

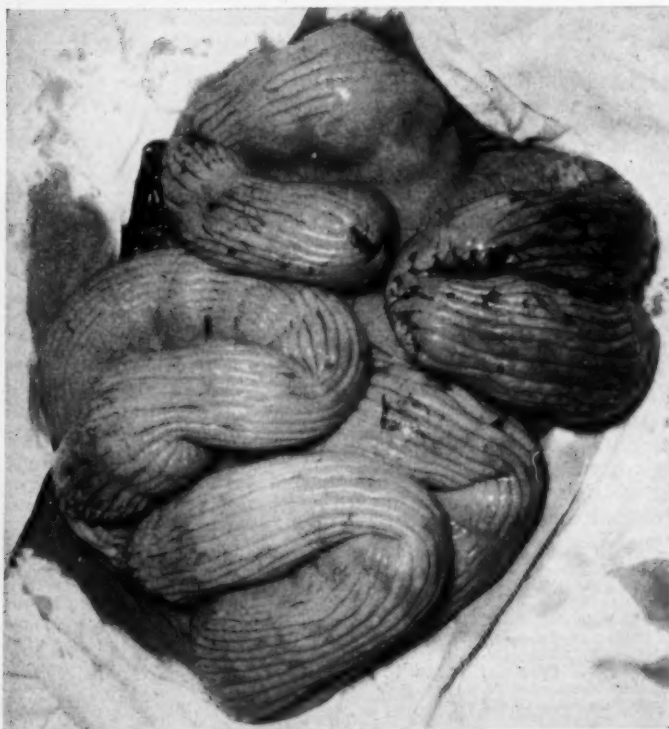


Fig. 2—Same uterus shown
in figure 1, three minutes
after administration of syn-
thetic oxytocin (5 units, in-
travenously).

TABLE 1—The Milk Flow and Milk Production of 4 Normal Sows Before and After Administration of the Oxytocin

Milk removal		Milking					
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Intervals (min.) between milkings.	Sow 1	-----	49	118	44	80	68
	Sow 2	-----	40	53	94	95	-----
	Sow 3	-----	72	50	59	44	-----
	Sow 4	-----	45	69	63	24	8
Method of milking.	Sow 1	P	P	P	P	P	P
	Sow 2	P	P	P	P	P	-----
	Sow 3	P	P	P	P	h	-----
	Sow 4	P	P	P	P	h	h
Injected units of the oxytocin.	Sow 1	0	0	0	0	0	5
	Sow 2	0	0	0	0	5	-----
	Sow 3	0	0	0	0	15	-----
	Sow 4	0	0	0	0	5	5
Duration of intravenous injection.	Sow 1	-----	-----	-----	-----	10 sec.	10 sec.
	Sow 2	-----	-----	-----	-----	10 sec.	-----
	Sow 3	-----	-----	-----	-----	12 min.	-----
	Sow 4	-----	-----	-----	-----	5 min.	2 min.
Duration (sec.) of milk flow.	Sow 1	10	12	12	12	12	240
	Sow 2	12	12	10	13	90	-----
	Sow 3	10	10	7	11	900	-----
	Sow 4	10	9	8	11	360	180
Amount (Gm.) of milk.	Sow 1	290	232	331	312	253	744
	Sow 2	258	222	163	221	314	-----
	Sow 3	175	293	260	286	1,055	-----
	Sow 4	234	237	270	205	485	270

P—by pigs; h—milked by hand.

and allow the milkers to finish their job. The milk flow started approximately 18 seconds after the injection was begun and was continued until the gland was evacuated (table 2).

The range in dose of the synthetic oxytocin given prior to hand milking these 3

sows was 2 to 5 units; however, there did not seem to be a correlation between the size of dose and the duration of milk flow. In sows 1 through 4 (table 1) there was a significant increase in production following the administration of the hormone. In sows 5, 6, and 7 (table 2) there was in general a

TABLE 2—The Milk Flow, Milk Production, and Milk Fat Content of 3 Normal Sows Before and After Administration of the Oxytocin

Milk removal		Milking									
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
Intervals (min.) between milkings.	Sow 5	----	56	62	123	192	165	176	174	176	55
	Sow 6	-----	70	80	125	181	182	169	170	191	----
	Sow 7	-----	62	65	126	175	172	175	176	183	----
Method of milking.	Sow 5	P	P	P	P	h	h	h	h	h	P
	Sow 6	P	P	P	P	h	h	h	h	h	----
	Sow 7	P	P	P	P	h	h	h	h	h	----
Injected units of the oxytocin.	Sow 5	0	0	0	2	5	8	6	10	10	0
	Sow 6	0	0	0	4	5	6	10	10	10	----
	Sow 7	0	0	0	5	6	8	9	7	10	----
Duration of intravenous injection.	Sow 5	----	----	----	5 sec.	3 min.	7 min.	4 min.	4 min.	4 min.	----
	Sow 6	-----	-----	-----	4 min.	3 min.	4 min.	4 min.	4 min.	4 min.	----
	Sow 7	-----	-----	-----	10 sec.	4 min.	5 min.	4 min.	3 min.	4 min.	----
Duration (sec.) of milk flow.	Sow 5	14	12	15	90	300	530	380	360	310	12
	Sow 6	10	12	8	90	300	350	300	320	300	----
	Sow 7	12	10	15	95	350	420	300	270	300	----
Amount (Gm.) of milk.	Sow 5	n+	n	n	n	615	739	618	544	446	n
	Sow 6	n	n	n	n	420	466	479	320	275	----
	Sow 7	n	n	n	n	524	510	555	443	467	----
Fat content (%)	Sow 5	----	----	----	----	8.0	7.0	7.3	7.7	7.7	----
	Sow 6	-----	-----	-----	-----	8.6	9.9	10.7	14.6	13.6	----
	Sow 7	-----	-----	-----	-----	7.7	7.2	6.9	7.7	7.4	----

P—by pigs; h—milked by hand; n+—not determined.

decrease in production on each successive milking. The percentage of butterfat remained relatively constant in sows 5 and 7, while in sow 6 there was a gradual increase in percentage so that the total amount of butterfat remained constant in spite of the decrease in total milk production. The hormone injections and hand milking of these sows did not alter maternal behavior or cause any other abnormalities.

EFFECT ON SOWS FAILING TO LETDOWN THE MILK

The first sow was four days postpartum and her pigs had been unable to get any milk for nine hours. The mammary glands seemed to continue filling and started to harden. The pigs finally showed extreme hunger and were beginning to tremble (room temperature, 68 to 77 F.). Five minutes after 15 units of synthetic oxytocin was injected intramuscularly, milk flow started; the pigs were satisfied before they were able to empty the mammary glands.

In a second sow, the pigs were unable to get any milk for four hours, and the udder had become full. One unit of synthetic oxytocin was injected intravenously and milk could be removed from the teats by hand after 25 seconds. Soon after this the sow lay down and allowed her pigs to nurse.

EFFECT ON SOWS WITH MASTITIS

In a group of 21 sows with mastitis, it was found that an intravenous injection of 1 to 5 units of synthetic oxytocin was sufficient to cause milk letdown and allow hand milking of the sow. These injections were given to facilitate collecting milk for microbiological studies. Intramuscular injections with the same dose were unsatisfactory for this purpose.

DISCUSSION

These observations demonstrate that synthetic oxytocin produces the effects in sows that previously had been obtained by the use of posterior pituitary extract or purified oxytocic principle. A dose of 5 to 10 units administered intravenously or 15 to 20 units given intramuscularly is sufficient to cause strong uterine contractions, as well as letdown of the milk.

This drug can be used in the clinical conditions described and it was especially useful for procuring milk samples for experimental work. Repeated injections produced no undesired side effects.

SUMMARY AND CONCLUSIONS

Synthetic oxytocin was used on 33 sows to stimulate parturient and mammary functions. It proved effective in treating 2 animals with secondary uterine inertia; it stimulated a prompt and strong contraction of the exposed uterus; it stimulated the letdown of milk in 2 cases of agalactia, and in 21 cases of mastitis. The milk letdown response and milk production was observed following the intravenous injection of this hormone in 7 normal sows.

The doses recommended for mature sows are: 5 to 10 units intravenously and 15 to 20 units intramuscularly.

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Treatment of Canine Nephritis

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ALTHOUGH NEPHRITIS can be classified clinically and pathologically in many ways, only four types were considered by us in treatment: (1) acute nephritis with anuria; (2) acute nephritis without anuria; (3) chronic uncompensated nephritis; and (4) chronic compensated nephritis. The history, clinical signs, and laboratory findings were used in making the classification. Previous illness, length of illness, duration and frequency of vomiting, diarrhea, depression, bad breath, weakness in the hindquarters, polydipsia, polyuria, and dehydration were carefully evaluated. The dogs were also watched after they had been hospitalized.

LABORATORY STUDIES

Clinical laboratory work was valuable in confirming the diagnosis and in determining what treatment, if any, was indicated. Most helpful were the leukocyte count, blood urea nitrogen (BUN) test, hematocrit reading, urinalysis and, in selected cases, an electrocardiogram.

The leukocyte count, used as an aid in determining the presence or absence of infection in dogs with nephritis, varied from 20,000 to 50,000 cells per cubic millimeter in acute nephritis and from 6,000 to 27,000 cells per cmm. in chronic nephritis. The BUN readings were useful in diagnosing nephritis, but can be frequently over-emphasized and misused as a prognostic guide. The BUN must be considered with the clinical signs before making a prognosis.

In this project, a few dogs with compensated nephritis appeared healthy, with a BUN of over 100 mg. per 100 cc., while some dogs dying from uncompensated nephritis had a BUN level of 60 to 90 mg. per 100 cc. Once the BUN becomes elevated above normal, it takes only a little additional kidney damage to greatly increase

it. The results of this study on canine nephritis agreed with those shown for human nephritis patients (fig. 1).⁹

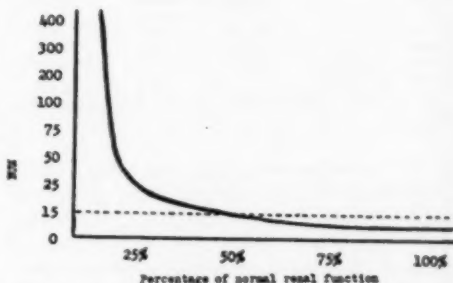


Fig. 1—Effect of kidney damage on blood urea nitrogen (BUN) in man.

Typical BUN ranges were 25 to 150 mg. per 100 cc. in acute nephritis and 20 to 300 mg. per 100 cc. in chronic nephritis.

In chronic uremia, where bone marrow depression was likely, a blood transfusion was given if the packed cell volume was below 25 per cent. Considering the possibility of potassium intoxication or over-hydration, resulting in pulmonary edema, a packed cell blood transfusion was indicated.² This consists of allowing the citrated blood to settle for 24 hours, permitting the cells and plasma to separate. After the plasma is drawn off, only the cells are transfused. Since most of the potassium passes into the plasma upon standing, a packed cell blood transfusion lessens the danger of cardiac potassium intoxication.

The urinalysis was helpful for the diagnosis and classification of nephritis. Typical findings are listed (table 1).

TABLE 1—Urinalysis Findings in Dogs with Acute and Chronic Nephritis

	Acute nephritis	Chronic nephritis
Specific gravity	1.030-1.050 early; then fixation at 1.010-1.020	1.007-1.015
Albumin	1-4+	Negative-2+
Bile	1+	Negative
Sediment	Granular and blood casts	Few casts

From the Angell Memorial Animal Hospital, Boston, Mass. Dr. Huff is now a small animal practitioner in Birmingham, Mich., and Dr. Pearson is on the small animal staff at Iowa State College.

The authors thank Dr. G. B. Schnelle and his staff at Angell Memorial Animal Hospital, and Dr. Warren R. Guild and his staff at Peter Bent Brigham Hospital, Boston, Mass., for their assistance.

TABLE 2—Results of Treatment of Dogs for Nonfatal Nephritis

Case No.	Days of vomiting	BUN(mg./-100 cc.) on admission and dismissal	Final diagnosis	Degree of clinical improvement
F4279	None	34-?	CIN	Good
II1036	None	48-39	CIN	Good
L556	1	26-?	CIN	Good
L2302	1	63-17	CIN	Good
L2537	None	147-102	CIN	Good
L2653	7	30-21	CIN	Fair
L2903	4	111-58	Leptospirosis	Fair
L3200	4	60-28	Subacute nephritis	Good
L4690	4	210-18	CIN	Good
L4930	5	70-80	CIN	None
L5045	Occasional	108-44	CIN	Good
F5294	Occasional	204-?	CIN	None

BUN—blood urea nitrogen; CIN—chronic interstitial nephritis.

An electrocardiogram was helpful in diagnosing the potassium intoxication associated with acute nephritis before clinical signs appeared. After the appearance of such clinical signs as acidosis-type respirations, staring eyes, complete prostration, absence of deep reflexes, paralysis of extremities, respiratory paralysis, and cardiac arrhythmia, the value of therapy is doubtful. Since few veterinarians have access to an electrocardiograph, the technique for its use will not be discussed.

TREATMENT

Acute Nephritis with Anuria.—Since this form of nephritis is rarely seen by the canine practitioner, in contrast to the physician,⁸ it will not be discussed.

Acute Nephritis Without Anuria.—This type of nephritis is familiar to the clinician in the form of leptospirosis and is treated in a manner similar to chronic uncompensated nephritis, which is discussed next,

TABLE 3—Results of Treatment of Dogs for Fatal Nephritis

Case No.	Days of vomiting	BUN(mg./-100 cc.) on admission	Postmortem diagnosis	Days of illness
C4587	5	120	Acute nephritis	2
I9914	21	162	Leptospirosis	2½
K4017	7	270	CIN	3½
L2554	7	200	CIN	4
L798	10	270	CIN, pneumonia	18
L1700	21	125	CIN	5
L2368	2	270	CIN	2
L2553	7	150	Uremia	9
L3299	3	204	Leptospirosis	4
L3544	7	340	Leptospirosis	3
L3971	21	102	CIN	3
L5829	4	120	Leptospirosis	3

BUN—blood urea nitrogen; CIN—chronic interstitial nephritis.

except that less extensive fluid and sodium therapy are necessary.

Chronic Uncompensated Nephritis.—This is the most common type of nephritis requiring treatment. When the treatment and results during previous years at Angell Memorial Animal Hospital were compared with those reported in this paper, it was felt that the latter had considerable value.

Fluid Therapy.—A 5 per cent dextrose solution was given subcutaneously every 12 hours at the rate of 10 to 15 cc. per pound of body weight. Soluble B vitamins (1 cc. every 24 hours) were given intramuscularly. If there was complete anorexia, 0.25 Gm. per pound of body weight of a protein solution (Parenamine*) was added to the dextrose every 12 hours to maintain positive nitrogen balance.⁹

If the subject could retain food, high-quality protein diet (K/D**) was given four to five times daily. Dogs with severe polyuria required free choice of water, and many required ice cubes, due to their vomiting.

Sodium Administration.—The dogs were given 30 gr. of sodium per 20 kg. of body weight three times daily. As explained to us,² the subject with renal failure is unable to increase tubular resorption and retains sodium by decreasing the filtration rate. This results in increased phosphate, sodium, and nitrogen retention. Thus, by increasing the sodium intake, the solute per tubule is greatly increased, causing an osmotic diuresis and eliminating more nitrogenous end products. Sodium may be given in the form of 10-gr. sodium bicarbonate tablets per os. If the subject is vomiting, 10 to 15 cc. per pound of body weight of isotonic sodium chloride and 1/6 molar sodium lactate in the ratio of 3:1 every 12 hours is given s.c.⁵

Infection.—Antibiotics were used when evidence of primary or secondary infection was present.

Vomiting.—A gastric antacid (Creamalin*), given at the rate of 4 drams per 20 kg. of body weight every six hours, combines with phosphates, coats the intestinal tract, and helps lower the gastric acidity.⁹ An antiemetic (Thorazine†) was frequent-

*Parenamine and Creamalin are produced by Winthrop Laboratories, New York, N.Y.; **K/D by Hill Packing Co., Topeka, Kan.; Thorazine by Pitman-Moore Co., Indianapolis, Ind.

ly used intramuscularly at the rate of 1 to 1½ mg. per pound of body weight every 12 hours to help control vomiting.

Anemia.—If the hematocrit reading was below 25 per cent, a packed cell blood transfusion was used.

Exercise.—Moderate forced exercise three to four times per day to increase the metabolism of the patient was important for recovery.

Peritoneal Lavage.—Peritoneal lavage is more indicated in acute than in chronic nephritis. Although we did not use this procedure as much as some,^{4,5,8,9} we feel that it is valuable and should be used by those practitioners treating an animal with nephritis.^{1,3,4,6-9}

Chronic Compensated Nephritis.—Dogs so affected were handled in a manner similar to that used by most practitioners. The same high-protein diet mixed with cooked oatmeal, vegetables, cheeses, and multiple vitamins was given for the rest of the dog's life. An attempt was also made to prevent secondary infections or undue stress which might disturb the animal's compensation.

DISCUSSION

One of the biggest problems in the treatment of nephritis is to know when enough kidney tissue is still present to warrant treatment. If less than 20 per cent of the normal kidney tissue is present and the kidney damage is not repairable, the best possible treatment could only prolong the subject's life a few extra days.⁹ Blood urea nitrogen values are often used as a prognostic aid, but unless they are considered along with history, clinical signs, and other laboratory tests, they can be misleading. Therefore, euthanasia of a dog just because the BUN is over 100 mg. per 100 cc. is certainly not justified.

Results of this study (tables 2, 3) pointed to several things which may be of help in making a prognosis. If vomiting had occurred for at least six days before hospitalization, the prognosis was usually poor, and few of these recovered. It was also observed that once clinical signs of hyperkalemia appeared, the animal was usually dead in 12 hours, even with the most elaborate treatment.

SUMMARY

In the study of an improved therapy for canine nephritis, four classifications of the

disease were considered: (1) acute nephritis with anuria; (2) acute nephritis without anuria; (3) chronic compensated nephritis; and (4) chronic uncompensated nephritis.

The preferred method of treating the latter type included the use of fluid therapy, high-quality protein diet, administration of sodium, antibiotics, gastric antacid, antiemetic, packed cell transfusions, moderate forced exercise, and peritoneal lavage.

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Specific Gravity of Small Urine Samples

The micro-sized urinometer is most useful in veterinary practice, yet the urine specimens obtainable from pets are often less than the required 10 to 12 ml. On these occasions, dilute the urine with distilled water and multiply the reading by an appropriate factor.

For example: to 4 ml. of urine, add 2 parts of distilled water and multiply the fractional part of the reading (those numerals to the right of the decimal point) by 3. Thus, if the specific gravity of the diluted specimen were 1.003, the corrected reading would be 1.009.—J. O. Knowles, V.M.D., Miami, Fla., at the 1959 Meeting of the Alabama V.M.A., in Dothan.

Ragweed Allergy in the Dog

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SPORADIC REPORTS of allergic manifestations in animals have appeared in the veterinary medical and medical literature for some time.^{1,6-9} We were given an opportunity to study a dog with a history of signs indicative of ragweed allergy, to determine whether this was an allergic manifestation, and to compare the clinical and immunological responses of the animal with those of human allergic patients.

CASE REPORT

A 2-year-old spayed Fox Terrier in southern Michigan was first known to have signs of lacrimation, conjunctivitis, and severe pruritus in mid-August of 1957, coincident with the pollination of ragweed. The condition was diagnosed as an allergic reaction and the dog was treated with antihistamines, with some relief of clinical signs. These subsided at the end of the ragweed season, in early October, 1957, and it was next examined in mid-August of 1958 when the same signs recurred.

Physical examination showed the dog to be in good general health. Positive physical findings included reddening of the conjunctiva, profuse lacrimation, and some purulent ocular discharge. An erythematous scaling eruption was present over its back and on the volar surfaces of the forelegs. The remainder of the physical examination showed negative results. Clinical signs persisted through August and September and began to subside in early October. The ocular lesions cleared completely by the middle of October. The skin lesions improved but persisted until mid-December when they gradually subsided.

Experimental Data.—The total white blood cell count was 13,000 per cubic millimeter with a differential count of 72 polymorphonuclear leukocytes, 13 lymphocytes, 5 monocytes, and 10 eosinophils. A

conjunctival smear stained with eosin and methylene blue showed large clumps of polymorphonuclear leukocytes.

Intradermal skin tests with 1:500 concentrations of pollen, mold, and dust extracts in saline solution, using saline solution as a control, were all negative with the exception of ragweed which showed a 3+ reaction. Serum was obtained from the dog, using sterile technique, and 0.05 cc. of this serum was planted in normal human skin. In 48 hours, a challenge inoculation made at this skin site with 1:500 extract of ragweed antigen gave a 4+ skin reaction, with a negative control. Attempts to demonstrate precipitating antibodies using ragweed antigen and serum from the dog with the Ouchterlony double diffusion gel technique⁴ were negative. The same result was obtained with human anti-ragweed serum.

Active cutaneous anaphylaxis, using the method of Ovary,⁵ was positive in the dog skin. For this test, 0.02 cc. of 1:500 ragweed antigen was injected intradermally and immediately followed by the intravenous injection of 1 cc. of 0.5 per cent Evans blue dye. A positive reaction was seen with a dark blue area at the site of the antigen injection and the saline control was negative.

Passive cutaneous anaphylaxis was attempted using the method of Ovary.⁵ Separate skin sites in the guinea pig were sensitized with 0.05 ml. of dog anti-ragweed serum and 0.05 ml. of human anti-ragweed serum intradermally. Challenge inoculations at these skin sites 24 hours later consisted of intradermal injection of ragweed antigen and intravenous injection of Evans blue dye. Positive Prausnitz-Kustner reactions were recorded but the passive cutaneous anaphylaxis reaction was negative. Similar results using human serum alone have been described.² A hemagglutination reaction using a modification of a method described in the literature³ was done* and a high titer was found.

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The author acknowledges the assistance of J. A. Hergett, D.V.M., who made the initial clinical observation of ragweed hypersensitivity in the animal described and made it available for our studies.

*The hemagglutination procedure was carried out by Dr. K. P. Mathews.

To observe the dog's reaction to ragweed pollen and ragweed antigen after the signs had subsided at the end of the ragweed season, it was placed in a small chamber and either dried ragweed pollen or water soluble ragweed extract 1:50 was nebulized into the chamber by means of a No. 40 DeVilbuss Nebulizer.**

After approximately ten minutes of exposure to high concentrations of ragweed pollen or the water soluble ragweed antigen, the dog developed the signs noted during the ragweed season: lacrimation, conjunctivitis followed by striking rhinorrhea, respiratory distress characterized by a marked change in respiratory rate, prolonged expiratory phase and, occasionally, an audible wheeze. If exposure were sufficient, vomiting and diarrhea occurred. The clinical signs were relieved in approximately $\frac{1}{2}$ hour by subcutaneous inoculation of 0.1 cc. of 1:1,000 aqueous epinephrine. The lacrimation and rhinorrhea were relieved by antihistamines; for example, parabromdylamine maleate, 2.5 mg. orally.

Control experiments using the same animal and either buffered saline solution or grass pollen antigen 1:50 did not result in the production of the signs. A summary of these studies and the results found in ragweed-sensitive human patients are shown (table 1).

DISCUSSION

From clinical observations and experimental data presented, it seems evident that this dog had a naturally occurring spontaneous ragweed sensitivity similar to that seen in ragweed-allergic human patients. The conjunctivitis, rhinitis, and respiratory distress seen in the dog are all seen in man.

The dermatitis occurring in the dog has some similarity to the atopic dermatitis seen in some allergic human beings. Positive skin tests to the suspected antigen, with appropriate negative controls, is further evidence of ragweed pollen sensitivity. The immunological investigations conducted to date provide some evidence that the dog has skin-sensitizing antibodies similar to the skin-sensitizing antibodies in man. These antibodies are passively transferable to normal skin and are nonprecipitating antibodies; these are two character-

istics of the type found in man with proved atopic disease.

In allergic conjunctivitis, a cytological study of conjunctival secretions would be

TABLE 1—Comparative Reactions of Man and Dogs to Ragweed Sensitivity Testing

Test	Ragweed-sensitive human beings	Ragweed-sensitive dog
Skin testing with ragweed antigen.	Positive	Positive
Conjunctival testing with ragweed pollen.	Positive	Positive
Passive transfer of reaction to normal skin with serum (Prausnitz-Kustner reaction).	Positive	Positive
Precipitin reaction with serum and ragweed antigen (Ouchterlony plate technique).	Negative	Negative
Active cutaneous anaphylaxis.	Not done	Positive
Passive cutaneous anaphylaxis in skin using serum from ragweed-sensitive patient.	Negative	Negative
Hemagglutination titer.	Positive (some)	Positive
Clinical signs produced by exposure to ragweed antigen.	Conjunctivitis Rhinitis Respiratory distress	Conjunctivitis Rhinorrhea Respiratory distress
Symptoms relieved by antihistamines and epinephrine.	Yes	Yes

expected to show eosinophils rather than polymorphonuclear leukocytes. However, we believe that the dog had a secondary bacterial infection of the conjunctiva which had followed the allergic conjunctivitis. As the allergic conjunctivitis improved at the end of the ragweed season, the bacterial infection also subsided concomitantly without specific treatment.

SUMMARY

A case of ragweed hypersensitivity in the dog is presented with clinical and experimental evidence indicating that a true spontaneous ragweed hypersensitivity may exist in the dog and that this hypersensitivity is similar to that occurring in human allergic conditions. Further investigations of such animals may well provide information leading to better understanding of this problem in man and in animals.

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Chemical Protection Against Nuclear Radiation

A drug, 2-aminoethylisothiuronium dibromide, popularly known as AET, prevents death in animals exposed to ordinarily lethal doses of nuclear radiation.

Workers have discovered that AET coats the natural proteins of the body, such as serum albumin, gamma globulin, and insulin, and is not readily removed. This coating is increased when the proteins are exposed to radiation from a cobalt bomb and becomes even more firmly attached to the proteins. It may be responsible for the prevention of radiation death in animals protected by the drug.

The ultimate purpose of current studies is to develop a drug which will be effective in man and which will protect those who must risk exposure to radiation in their work, in treatment of cancer, or in space travel.—*News release (April 15, 1959), Albert Einstein Medical Center, Philadelphia.*

Protecting Dogs Against Radiation.—

Two well-known chemicals, poisonous when used alone, have been combined to provide internal immunity against radiation in animals.

All of 20 dogs successfully protected against normally lethal doses of radioactivity, after being inoculated with the combined drugs, were apparently healthy eight months after irradiation.

Although each of the chemicals, mercap-

toethylamine and cysteine, were previously known to have antiradiation properties, they are toxic to such a degree that they could not be given in large enough amounts to provide protection. It was found that the two chemicals, when combined, increase their protective power without increasing their toxic effect. This made it possible to provide radiation protection with smaller, nontoxic doses.—*News release (April 14, 1959), Walter Reed Army Medical Center, Washington, D.C.*

Monocytes Permit Bacterial Multiplication

Since it has been known for half a century that plague organisms (*Pastuerella pestis*) are introduced into the body by means of flea bites, fleas were permitted to feed on mice which were dying of plague. The fleas were then held under the exact conditions required for them to carry the infection. When they were able to transmit the disease, tests were conducted to determine if the bacteria were destroyed by the white blood cells.

The neutrophils were found to readily ingest and destroy the plague organisms. In the numerically inferior monocytes, however, the bacilli multiplied. When the monocytes became filled with plague bacilli, they burst, releasing bacteria of increased virulence which were able to resist ingestion by other leukocytes and produce plague in the victim.—*News release, (April 16, 1959), Walter Reed Army Medical Center, Washington, D.C.*

Milk Test for Ketosis in Cows

A Ross urine test for ketone bodies is useful in that a negative test rules out ketosis. Not all cows with positive tests require treatment. A modified Ross test on milk is less sensitive and, therefore, is a more definite indication of the need for treatment. In general, the milk level of ketone is about one half of the level in blood, whereas urine levels are about four times that of blood.

When milk tests were made weekly, for four weeks following calving, on 20 cows considered susceptible to ketosis, the tests were markedly positive in only 2 cows. These 2 cows were the only ones that required treatment.—*J. Dai. Sci. (April, 1959): 705.*

A Parasitism in Turkeys Due to a Hemoproteus-like Blood Parasite

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HEMOPROTEUS INFECTION was observed in a half-grown turkey from Texas in 1938.⁶ The infection was later reported in 1 of 4 domestic turkeys near the District of Columbia in 1941,⁸ in 5 of 97 wild turkeys in Pennsylvania in 1948,⁴ in 3 of 10 domestic turkeys in South Carolina in 1951,¹ and in 1 of 2 wild turkeys in Georgia in 1953.⁵ This report concerns the finding of a large number of turkeys in a South Carolina flock parasitized with a Hemoproteus-like blood parasite.

CASE HISTORY

On Dec. 3, 1958, the owner of a breeder flock of 600 turkeys known to have previously been infected with *Leucocytozoon smithi* presented 4 birds to the Clemson College Diagnostic Laboratory for examination. One or 2 birds had been found dead each morning for three days, and about 20 birds were obviously sick.

Necropsy of the 4 birds revealed some enlargement of the livers, spleens, and kidneys. Most of the turkeys in the area, however, have enlarged spleens, resulting from a *Leucocytozoon* infection.

A blood smear made from 1 of the birds and stained with Giemsa's stain was found to contain relatively large numbers of blood parasites identifiable as *Leucocytozoon*. In addition, a large number of the red blood cells contained a blue-staining body, which was somewhat variable in shape but generally was sausage-shaped. It usually filled about one half the cytoplasm of the cell and curved slightly around each end of the nucleus. The body had the appearance of one of the *Plasmodium* or *Hemoproteus* species. Bacteriological examination failed to reveal any evidence of a bacterial infection.

Two days later, while visiting the affected flock, blood smears were obtained

from 52 birds, including several of the obviously sick birds that had been isolated. The blood smears were stained with Giemsa's stain, and 22 (42.3%) of the smears were found to contain the parasite in the erythrocytes. Only 2 of the smears, both from birds that were obviously ill, were heavily parasitized. All 52 of the slides contained *L. smithi*.

EXPERIMENTAL STUDY

One of the 2 heavily parasitized birds was killed and portions of the lungs, liver, kidneys, spleen, and bone marrow were separately triturated in sterile water. Inoculum (2 ml.) from each triturated sample was injected intraperitoneally into each of 5 6-week-old turkeys. Blood smears obtained from them periodically for six weeks revealed no evidence of the blood parasite. None of the inoculated birds showed evidence of illness.

Blood smears from the other heavily parasitized bird were found to be completely free of the parasites on the forty-first day of observation.

Based on the morphology, the staining characteristics, and failure to transmit the parasite, the organism found in the red blood cells is believed to have been a member of the *Hemoproteus* species. While its morphological and staining characteristics are similar to those of the *Plasmodium* species, the latter is transmissible directly from one bird to another by the methods used. Also, *Plasmodium* species has asexual stages which can be found in red blood cells. No asexual stages were noticed in any of the slides examined.

DISCUSSION

The blood parasitisms of birds include the true bird malarias due to *Plasmodium* species and the malarial-like parasitisms caused by the *Leucocytozoon* and *Hemoproteus* species. *Plasmodium* species in turkeys was reported in Russia in 1914, and Kenya Colony, British East Africa in 1941.⁷ Over 45 species of *Hemoproteus*

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The authors acknowledge the assistance of Dr. Martin Young, Tropical Disease Laboratory, U.S. Public Health Service, Columbia, S.Car., for supplying references, other information, and advice relative to the differentiation of blood parasites in birds.

have been reported, most of which are found in birds.²

Species of the hippoboscids have been incriminated as vectors of *Hemoproteus columbae* in pigeons, mourning doves, and quail. The biting midge (*Culicoides*) has been incriminated as a vector of the disease in ducks.³

The parasitized turkey breeder flock referred to in this report is in the semi-tropical area of the coastal plains of South Carolina and was raised on the edge of a swamp area inhabited by wild turkeys. They may have been the source of the *Hemoproteus*-like infection.

SUMMARY

A *Hemoproteus*-like parasitism in a flock of domestic turkeys is reported. This may be the first report of such parasitism in a large number of turkeys in one flock.

Wild turkeys were a possible source of the infection. Further work relative to pathogenicity, the incrimination of a vector or vectors, and the precise identification of the blood parasite is planned.

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Cage Paralysis in Laying Hens

Cage fatigue, or cage paralysis, has become an important problem with the rapid increase in the practice of keeping laying hens in individual cages. The exact

cause is not known but is apparently associated with nutritional factors and influenced by changes in the metabolic and physiological functions. It can usually be diagnosed from the flock history, the signs and lesions, and the elimination of other common causes of paralysis.

Most birds recover if they are removed from the cage in the early stages of the disease and placed on the ground or floor.—*L. C. Grumbles in Avian Dis. (May, 1959): 122.*

Cage vs. Floor Housing of Hens

In a 308-day trial with 873 hens, at Texas A. & M. College, the birds in cages produced 1.3 per cent more eggs, the average egg weight was significantly higher, the average body weight was greater, and they required less feed per lb. of eggs than did birds allowed freedom on the floor. There was no significant difference in the mortality of the two groups.—*Poult. Sci. (May, 1959): 565.*

Bursa of Fabricius and Antibodies

Chickens inherit a resistance or susceptibility to *Salmonella pullorum* infection which has been reported to be related to differences in body temperature and lymphocyte counts. Both the bursa of Fabricius, which lies dorsal to the cloaca, and the spleen are involved in antibody production.

In several experiments, using over 300 chickens, all of those from which the spleen and the bursa had been removed at 2 or 3 weeks of age, died when inoculated with *Salmonella typhimurium* at 8 weeks of age. Mortalities in the other groups were: 70 to 80 per cent for those bursectomized only; 14 to 40 per cent for those splenectomized only; and 10 to 20 per cent for the unoperated controls.—*Poult. Sci. (Jan., 1959): 174.*

Fowl Semen Flown Across Atlantic

Semen from several new (crossbred) breeds of chickens were sent by air from the University of Maryland to Israel and Scotland. The time from collection to insemination was about 38 hours, and the percentage of the resulting egg fertility was about 37 per cent in both countries.—*Vet. Rec. (Jan. 17, 1959): 52.*

Simultaneous Feeding of Amino Acids

To utilize the protein in the diet, an animal must get all the essential amino acids simultaneously. When rats were fed a ration containing two proteins, each lacking a different amino acid, they gained much better when the two were fed simultaneously than when one was fed during the day, the other during the night.

In an attempt to simulate conditions where people consumed a high protein diet after a day of hunting or fishing, then only carbohydrates for several days, two groups of weanling rats were used. One group was given a high protein diet in the day time and a low protein diet at night. The two diets were mixed for the other group. The latter group gained 20 per cent faster than the alternately fed group. The offsprings of these rats were maintained on the same diets as their parents. This made no difference in the number of litters, the number or weight of the young per litter or their mortality, but the young of the alternately fed mothers weighed considerably less when weaned, probably due to poorer lactation.

Although the hemoglobin levels were the same in both groups, recovery from anemia, when it was induced, was much slower in the alternately fed rats. Apparently animals have a limited ability to store amino acids as such.—*Nutr. Rev.* (March, 1959): 87.

Enzymatic Function of Vitamin B₁₂

Although not definitely proved, there is evidence that vitamin B₁₂ is a factor in the enzymatic incorporation of amino acids into proteins, possibly by activation of the amino acids. Incorporation of a number of amino acids into liver proteins of rats and pigs was, *in vitro*, decreased in B₁₂ deficiency but was almost fully restored when the vitamin was added.—*Nutr. Rev.* (Feb., 1959): 63.

Age and Vitamin B₁₂ Metabolism

The serum vitamin B₁₂ level has been found to decrease with age in man and rats. In a study made on inmates of hospitals, a penal institution, and a home for the aged, the level of vitamin B₁₂ decreased from approximately 300 $\mu\text{g./ml.}$ at age 20 to about 100 $\mu\text{g./ml.}$ at age 100. To avoid

the possibility that this might be due to proper diets in institutions, a study was made of persons in their homes. Here, the vitamin B₁₂ serum level gradually dropped from 284 $\mu\text{g./ml.}$ at age 19 to 90 $\mu\text{g./ml.}$ for persons over 70 years old.

In rats kept on a constant stock diet, the level dropped from 600 $\mu\text{g./ml.}$ for those about a month old to 350 $\mu\text{g./ml.}$ for those 36 months old. Absorption was poorer in younger rats but this was more than compensated for by increased food intake per unit of body weight.—*Nutr. Rev.* (Feb., 1959): 40.

Metabolic Influences on Healing

As the result of important advances in knowledge of its growth and metabolism, connective tissue is no longer considered an inert supporting substance. It undergoes changes in response to hormones, metabolic alterations, and diseases. With respect to wound healing, the tensile strength of wounds has been shown to rise with collagen formation and the synthesis of collagen is prevented by depriving animals of vitamin C. The synthesis of collagen was also retarded by feeding a diet deficient in protein for five days before creating the wound. This condition could be corrected by adding methionine to the protein-free diet.

The retardation of epidermal regeneration, capillary proliferation, and formation of granulation tissue by cortisone and related steroids is well known. It is generally accepted that there is no practical way to obtain accelerated healing in an otherwise healthy individual.—*Nutr. Rev.* (May, 1959): 144.

Prophylactic Dose of Vitamin D for Parturient Paresis

A field experiment with 30 Jersey herds in Ohio indicated that 20 million units of vitamin D daily per cow, for three to seven days before calving, was as effective as 30 million units per day.

Of 124 Jersey cows, all with histories of having had parturient paresis, 25 per cent of those given 15 million units daily developed the disease as compared with 14 per cent of those given 20 million units, and 13 per cent of those given 30 million units daily. Of 39 such cows untreated, 64

per cent developed the disease. Thus, a dose of 15 million units protected 60 per cent, 20 million units protected 79 per cent, and 30 million units protected 81 per cent of these cows from having recurrences of parturient paresis.

Vitamin D was fed twice daily beginning five days before the expected parturition. If the cow calved before the seventh day, treatment was continued one more day. Treatment was discontinued after seven days even if the cow had not calved. Only the cows that had been treated at least three days and those that had calved within two days after the last treatment were considered in compiling these statistics.—*J. W. Hibbs and W. D. Pounden in Hoard's Dairyman (May 10, 1959): 505.*

Hypovitaminosis A and Ascariasis

Hypovitaminosis A and Ascariasis together accounted for 62.5 per cent of mortality on a poultry farm in India. There were indications of a vicious cycle, the hypovitaminosis favoring the worm infection and the parasites damaging the intestinal mucosa, thus enhancing the vitamin A deficiency. The vitamin A reserve in the liver was much lower in heavily parasitized birds than in those relatively free of ascarids. Also, the time required for lesions of vitamin A deficiency to develop was much shorter in parasitized birds.

Birds fed 2 oz. of greens daily for a year were reasonably healthy and productive on grounds contaminated with ova of *Ascaridia galli*.—*Poult. Sci. (Jan., 1959): 13.*

Vitamin A Destroyed by Blood

Little is known about the ultimate disposition in the body of most vitamins. When large amounts of vitamin A and carotene are injected intravenously, levels in the blood could account for all of it five minutes later but only 6 per cent two hours later, and none six hours later. A small amount was found in the heart, lungs, and kidneys, but ten times as much in the liver.

The vitamin was relatively stable in homogenates of liver, kidney, lung, and spleen, but 46 per cent was destroyed in hemolyzed blood. Practically all of it was destroyed in washed and hemolyzed erythrocytes, whereas it was stable in the

serum. Destruction by the blood was even more rapid when reticulocytosis had been induced. Thus blood appears to be the tissue primarily responsible for the rapid destruction of vitamin A and carotene.—*Nutr. Rev. (May, 1959): 142.*

Cobalt and Vitamin B₁₂

Cobalt constitutes 4 per cent of the vitamin B₁₂ molecule. Swiss pasture forage, which contains 70 to 420 µg. of cobalt per kg. of dry weight, will support normal growth of cattle. Root nodules of legumes metabolize cobalt into vitamin B₁₂. Various microorganisms in the soil are vitamin B₁₂ dependent. Microorganisms in the intestinal tract also metabolize cobalt into this vitamin.

Hyperthyroidism has been reported in countries where the soil is deficient in cobalt. The style, stigma, and pollen of a plant (*Lilium*) are much richer in cobalt than are the vegetative tissues, indicating that cobalt is a factor in pollination.—*Rev. path. gén. et physiol. clin. (Feb., 1959): 263.*

Phosphorus Deficiency in Cattle

In South Australia, many milking cows show signs of phosphorus deficiency, especially in summer months. They gradually lose condition and develop a craving for bones, dead birds, and other materials. Later, they develop a stiff gait and lose interest in food. Some die from botulism as a result of chewing these objects.

Treatment consists first of vaccinating the cattle against botulism, then supplementing their diet with superphosphate, dicalcic phosphate, or sterilized bone meal. The latter is fed daily at rates of ½ lb. per week to calves and 2 lb. per week to milking cows.—*J. Agric. South Australia (Feb., 1959): 295.*

Effect of Zinc on Perosis in Turkeys

Turkey poults developed perosis when fed a purified ration containing soybean as the source of protein. The addition of zinc to the ration improved the growth of the birds and reduced the incidence and severity of perosis. Approximately 66 p.p.m. of zinc in the ration resulted in optimum growth.—*Vet. Bull. (Jan., 1959): Item 192.*

Vertical Integration in Animal Agriculture

Guest Editorial

When one reviews the written material on vertical integration in agriculture, he does not get far before he recognizes a monotonous sameness. Each writer follows the same line, uses the same terms, employs the same enthusiasm, and is careful to reassure those who will be pinched. The only differences reflect individual viewpoints—for example, one writer says less than 2 per cent of the swine are now raised in integration programs while another says more than 10 per cent are.

Recently, the writer had the good fortune to attend an agricultural conference as an "uninvited guest." Printed on the program was a statement that the purpose of the conference was "a thorough, objective, and open discussion of broad problems related to agriculture and associated industries, better health through proper nutrition, sound policies, and the economic and social welfare of our people." Social welfare was listed last and was mentioned apologetically on only three occasions.

As for nutrition, it was proposed that research be directed toward removal of fat from meat so that people would eat more meat yet not become obese. The ultimate objective of eating more meat seemed to be the increased sales and greater profit. It was not established that more protein was required by those who would eat it. One individual was heard to mutter that more people died of overeating in the United States than of undereating.

With minor exceptions, the only topic of discussion was profit—profit through processing, through advertising, through merchandising, etc. — "maximizing" profits. Anything which returns monetary profit seems to be considered beneficial to "the social welfare of our people."

Integration in agriculture has been going on for a long time. Now that someone has given it a name, it has been "discovered." Vertical integration and contract farming are essentially the same. Such terms, along with "agri-business," might be defined as cohabitation of agriculture and business for the final benefit of one or the other.

INTEGRATION AND ANIMAL DISEASE

Until the salmonellosis were controlled, it was not possible to integrate turkey pro-

duction to the extent it is today. Until means for the control of respiratory diseases of chickens were available, integration of the broiler industry was not possible. Before 1920, it was reasonably safe to feed large numbers of chickens in a limited area. With the advent of laryngotracheitis this was no longer true. Over 20 years and three other respiratory diseases later, it was reasonably safe to establish an integrated broiler industry.

It has been said that swine are probably the most susceptible of meat animals to disease; however, it is unlikely that swine are more susceptible to dysentery or TGE than are chickens to Newcastle disease or bronchitis. The truth is that means for control of many swine diseases have not been developed because many in authority believe that research on swine diseases and the development of control measures cost too much. This conclusion may have been reached because so many swine raisers have seemed to oppose research on and control of swine diseases, except for what each one might care to do himself.

SWINE INTEGRATION

Even as it was impossible to successfully raise chickens in concentration until the respiratory disease was controlled, so also it will be impossible to concentrate large numbers of swine in a limited area until the diarrheas are controlled. Methods for control of diarrheas are available but they are costly and require a little work—the disease cannot be controlled by a little feed additive.

Most of the so-called "pig hatcheries" in the Middle West have failed because of diseases of the digestive tract; concentration of hogs means concentration of disease. It has been said the "pig parlors" of the South have no trouble. I have not seen these southern operations, but if the enteric diseases have been controlled it must be due to an unknown factor because all the diseases that occur in the North also occur in the South.

At present, a popular matter for discussion is the "meat-type hog." The meat-type hog is much like "stress," also a popular topic of conversation. Few who talk about the latter know exactly what they are dis-

cusssing or would be able to measure it. Those who discuss integration give the impression that great advances have been and are being made in development of the meat-type hog and that integration has been responsible for such improvement in pork. The fact of the matter is that progress in the development of such hogs is coming slowly. Only those who are really working on the improvement of pork through development of hogs with more meat and less fat realize the huge problems they face. A little integration of the swine industry will not cause these problems to suddenly vanish.

Actually, integration needs the meat-type hog, but the meat-type hog does not need integration.

THE RICH GET RICHER

Large operators, such as integrators, who encounter disease problems usually go directly to experiment stations where a solution, if there is one, is obtained without cost. It has been repeatedly observed that small operators who are comparatively more in need and less able to stand loss are least apt to request experiment station aid. Recently a huge industrial organization enlisted the aid ("for free") of several experiment stations, which after the expenditure of thousands of dollars, corrected the organization's trouble. It can be said, of course, that these experiment stations were working for the benefit of producers in general. However, it seemed that the stations were working for the one organization as against thousands of producers who supported the stations. The only friends these smaller producers had during that time were the practicing veterinarians who gave sound advice and saved thousands of head of livestock for the producers.

Presently, it is said that 90 per cent of broilers, 50 per cent of turkeys, 30 per cent of milk production, and between 1 and 12 per cent of swine production are under integrated programs. What part the cooperatives will continue to play in integration is problematic. The cooperatives are faced with bitter enemies and will need the best of aggressive leadership if they are to survive.

Dean E. L. Butz of Purdue University has said, "Agriculture is changing from a way of living to a way of making a living." Some are wondering if this is not selling a rich inheritance too cheaply.

ROLE OF THE VETERINARIAN

Except for some small animal practice, the veterinary profession is built on practical economics. Even so, we have failed to effectively sell our services where they bring the greatest return to the livestock industry; that is, in the supervision of reproduction and production, and the prevention of disease.

It has been predicted that with "company control" will come company veterinarians who will supervise lay personnel who are performing veterinary work. Veterinary practitioners should study the changing patterns of agricultural progress and be prepared to adjust to them. In other words, "if you can't beat 'em, join 'em."

We can all say with Mortimer Snerd: "It ain't going to be easy"—it never was.—*S. H. McNutt, Professor, Veterinary Science, University of Wisconsin, Madison.*

A New British Research Journal

An editorial in the *Veterinary Record* (May 2, 1959) announces the decision of the British Veterinary Association to publish a quarterly research journal, starting in January, 1960. Its title will be *Research in Veterinary Science*.

The Editorial Board will consist of Dr. A. W. Stableforth, chairman; Prof. W. I. B. Beveridge, vice-chairman; Mr. H. E. Harbour, scientific editor; with 15 other scientists representing the various disciplines in veterinary research. The Association's editor, Mr. Charles Mitchell, will serve as executive editor. Articles written in English, submitted from any country, will be welcomed for consideration. Each quarterly issue should contain about ten to 12 papers.

The American Veterinary Medical Association welcomes the inauguration of this new research journal and wishes it every success. It will provide an additional needed outlet for the constantly increasing volume of research which is of interest to the veterinary medical profession.

Abstracts

Infectious Bovine Rhinotracheitis

The histopathology of infectious bovine rhinotracheitis (IBR) was investigated in experimental calves. A description of intranuclear inclusion bodies occurring in epithelial cells of the respiratory tracts of calves inoculated intranasally with three strains of infectious bovine rhinotracheitis virus was presented. The inclusions occurred as early as 36 hours postinfection and persisted through 60 hours.

Acid fixation with Zenker's and Bouin's fluid were superior to formalin in the demonstration of well-formed inclusions.

The value of inclusions as an aid in clinical diagnosis is questionable in view of their transitory nature.—[R. A. Crandell, W. J. Cheatham, and F. D. Maurer: *Infectious Bovine Rhinotracheitis—The Occurrence of Intranuclear Inclusion Bodies in Experimentally Infected Animals*. *Am. J. Vet. Res.*, 20, (May, 1959): 505-509.]

Virus of Avian Infectious Laryngotracheitis

The structure of the virus of avian infectious laryngotracheitis was studied in sections of the chorioallantoic membranes of chicken embryos. Five days after inoculation of 9-day embryonating chicken eggs, the membranes were harvested, fixed in osmium tetroxide buffered at a pH of 7.6 and, following dehydration in ethyl alcohol of graded dilutions, embedded in methacrylate.

Viral particles were seen most commonly in the cytoplasm and rarely within the nuclei of endothelial cells. The intracytoplasmic forms ranged from 150 to 240 m μ in diameter and displayed an opaque core measuring 50 to 80 m μ thick. The intranuclear particles of virus varied in size from 30 to 40 and from 80 to 100 m μ in diameter, with only the larger forms possessing an outer coat delineated by a very thin membrane.

Occasionally, slender and sometimes branching tubules occurred among the viral particles of cytoplasmic aggregates. A number of such tubules appeared to be closely associated with the capsules of virus.—[A. M. Watrach, A. E. Vatter, L. E. Hanson, Marian A. Watrach, and H. E. Rhoades: *Electron Microscopic Studies of the Virus of Avian Infectious Laryngotracheitis*. *Am. J. Vet. Res.*, 20, (May, 1959): 537-544.]

Experimental Distemper in Mink and Ferrets

In these experiments, distemper virus was pantropic in both mink and ferrets, although the respiratory system was the favorable site of multiplication as judged by early propagation and high titers in these organs.

Migration of the virus was by the blood stream; viremia was demonstrated in ferrets on postexpo-

sure day 2, and in mink on day 3. It persisted until eliminated by antibody in the blood or until death of the host.

The viral titer in the lungs of ferrets reached 10^4 on postexposure day 6, while in mink this titer was reached on day 10. Both species had a titer of 10^4 on day 12. The same high titers were found in the nasal mucosa but developed a day or two later.

Viral titers of the spleen were about one dilution lower and titers of the blood, brain, liver, muscle, adrenal gland, salivary gland, and thyroid were still lower.—[Edward Crook, J. R. Gorbam, and S. H. McNutt: *Experimental Distemper in Mink and Ferrets*. *I. Pathogenesis*. *Am. J. Vet. Res.*, 19, (Oct., 1958): 955-957.]

Action of Two Halogenated Sulfapyrimidines

The authors studied two haloid sulfonamides: 2-sulfanilamido-4,6-dimethyl-5-bromopyrimidine (bromosulfamethazine-BrMt-) and 2-sulfanilamido-4-methyl-5-bromopyrimidine (bromosulfamerazine-BrMr) and the corresponding nonhalogenated compounds (Mt and Mr).

The haloid sulfonamides were found to have a higher acute toxicity in mice, an equal or little higher *in vitro* activity, an increased degree in *in vitro* plasma protein binding, and a higher peak plasma concentration after intravenous administration in cattle, but no more prolonged persistence in the circulation.

The BrMr plasma levels after oral administration in cattle resulted in higher and more prolonged retention compared with Mr ones. BrMt plasma levels after oral administration in cattle were found lower than Mt ones and of negligible therapeutic interest.—[R. Faustini, R. Ferrini, and M. A. Vaghi: *The Pharmacological Action Developed in Cattle by Two Halogenated Sulfapyrimidines—Bromosulfamerazine and Bromosulfamethazine*. *Am. J. Vet. Res.*, 20, (May, 1959): 483-486.]

Tuberculins Produced on Synthetic Mediums

For years, tuberculins used for testing cattle for tuberculosis in the United States were produced by laboratories of the U.S. Department of Agriculture, utilizing the Dorset-Henley synthetic medium for the growth of tubercle bacilli. The source of nitrogen in the medium was L (-) asparagine. During and following World War II, the cheaper source of nitrogen, ammonium-L(+) glutamate, was used as a substitute for asparagine.

Tests on cattle in four different experiments by methods already described by Johnson, Wadley, and others indicated that the tuberculins derived from mediums in which the source of nitrogen was ammonium-glutamate were equal or superior in potency to those derived from mediums in which the source was asparagine.

Optimum tuberculin production on ammonium-

glutamate medium required the addition of trace quantities of copper and zinc salts. The same was found to be true with certain brands of asparagine used to prepare the medium.—[L. A. Baisden, H. W. Johnson, A. B. Larsen, and A. H. Groth: *Comparative Potencies of Tuberculins Produced on Asparagine and Ammonium Glutamate Mediums*. *Am. J. Vet. Res.*, 19, (Oct., 1958): 985-989.]

Chronic Copper Toxicosis in Sheep

The clinical changes, gross pathological findings, histopathological findings, and blood and liver copper levels following daily administration of 250 mg. per day of copper to sheep are presented. Interpretation of the data leads to the conclusions that the blood copper levels in sheep may be used for a definitive diagnosis of poisoning by this ion if 244 µg./100 ml. or higher, and that the hemolytic syndrome commonly associated with copper poisoning is not an essential criterion for its diagnosis.—[M. D. Sutter, D. C. Rawson, J. A. McKeown, and A. R. Haskell: *Chronic Copper Toxicosis in Sheep*. *Am. J. Vet. Res.*, 19, (Oct., 1958): 890-892.]

Kynurenin and 3-Hydroxykynurenin in Urine

Kynurenin and 3-hydroxykynurenin were determined by ion exchange chromatography, paper chromatography, and by spectroscopic, colorimetric, and enzymatic investigations. The occurrence of these metabolites of tryptophan has been demonstrated for the first time in bovine urine. Dairy cows on normal rations excreted 7.9 to 19.5 mg. of L-kynurenin and 6.9 to 29.4 mg. of 3-hydroxykynurenin per gram of creatinine. The high levels of these metabolites were of more interest in the light of the high incidence of bladder cancer in this species.—[A. M. Pamukcu, J. M. Price, and R. R. Brown: *Identification and Determination of Kynurenin and 3-Hydroxykynurenin in Bovine Urine*. *Am. J. Vet. Res.*, 20, (May, 1959): 597-602.]

Urinalysis in Bovine Botulism

Fifty-five cattle suffering from botulism were examined; urinalysis was made in 17. All showed indicanuria, 13 showed albuminuria, and 6 showed glycosuria. Glycosuria was seen especially in cattle with acute cases.

In order to compare the data of the affected animals with those of normal ones, the results of urinalysis of 10 normal cows were also reported.—[Abmet Noyan: *The Value of Urinalysis in Bovine Botulism*. *Am. J. Vet. Res.*, 19, (Oct., 1958): 840-841.]

Inclusion Body Rhinitis of Swine

Of 37 pigs from one herd, 9 (24 to 55 days old) showed lesions of inclusion body rhinitis (IBR, Done, 1955) and 8 (35 to 62 days old) showed atrophic rhinitis. Though both conditions can ex-

ist concurrently, pathognomonic lesions of IBR usually appear earlier than those of atrophic rhinitis. Inclusion body rhinitis may be identical with the filterable agent described by Switzer (1956) as a factor in atrophic rhinitis, and may be caused by a virus of the cytomegalic group.—[J. D. J. Harding: *Inclusion Body Rhinitis of Swine in Maryland*. *Am. J. Vet. Res.*, 19, (Oct., 1958): 907-912.]

Books and Reports

Benign Enzootic Paresis of Pigs in Denmark

This is the report of work with an infectious disease of swine which is characterized by ataxia and paresis. Its course is acute or semichronic. Increase in body temperature is found only in initial stages. Morbidity is less than 50 per cent, often much lower, and recoveries are the rule; mortality is often about 1 per cent. It persists in a herd for several months. The disease is readily transmitted to pigs by intracranial inoculation, the incubation period being seven to 19 days. The causal agent is filterable, resistant to ether and 50 per cent glycerin. It was not demonstrated in the urine or blood and was not found in lice taken from affected pigs. It was not established in tissue cultures and apparently failed to infect mice, guinea pigs, rabbits, cotton rats, hamsters, or dogs.

The disease resembles many others of the nervous system in that there are apparently no true gross lesions. Histopathologically, it is a nonpurulent polioencephalomyelitis. In many ways, the disease is a lesser Teschen disease, but the two appear to be totally unrelated. Although differential diagnosis is of major concern in Europe, Teschen disease results in a much higher mortality and is more easily transmitted, especially intranasally.

In the United States, the conditions known as paraplegia would offer a challenge in differential diagnosis. In fact, it is believed that some of these are caused by infection of some sort. Salt and other poisonings could also be confused with it. Hog cholera, pseudorabies, rabies, and the encephalitides caused by bacteria would be much less apt to be confused with this disease which is known as enzootic paresis in Denmark.

The monograph is pleasingly complete, well prepared, well printed on good paper, and contains outstanding reproductions. Those in research in the United States can well feel a bit envious of this kind of treatise because it rarely happens that there are funds to prepare complete monographs of research work in this country. The result is that much is lost. One might ask if this is what is meant by "saving money" of which we hear so much?—[*A Study of Benign Enzootic Paresis of Pigs in Denmark*. By Aage Thordal-Christensen. On Commission to Carl Fr. Mortensen, Ltd., Copenhagen, 1959. Printed by Nordlundes Bogtrykkeri, Copenhagen. Price not given.]-S. H. McNUTT.

THE NEWS

Dr. Durbin Appointed Veterinary Medical Director of FDA's Bureau of Medicine

Dr. Charles G. Durbin (UP '49) was named veterinary medical director, veterinary medical branch, of the Food and Drug Administration's Bureau of Medicine on April 15, 1959. He succeeds the late Dr. John H. Collins, who died of a



Dr. Charles G. Durbin

heart attack on March 29 (see the JOURNAL, May 15, 1959, p. 489).

Dr. Durbin had been associate director of the veterinary medical branch since the fall of 1953. In 1952, he transferred to the Food and Drug Administration to direct the therapeutic testing laboratory at Beltsville, Md. From 1949 until 1952, he had been engaged in parasite research for the zoological division of the U.S.D.A.'s Bureau of Animal Industries.

In 1956, Dr. Durbin received an award in recognition of conceiving, organizing, and carrying through the Symposium on Medicated Feeds, which was held in Washington, D.C., in January, 1956.

Among Dr. Durbin's affiliations, he has served as secretary-treasurer (1955-1956), president (1957), and currently as chairman of the executive committee of the District of Columbia V.M.A.; as secretary of the Helminthological Society of Washington (1952); and as vice-president of the Association of Veterinary Parasitologists.

Completing his graduate work at the University

of Maryland in virology and zoology, Dr. Durbin has several publications to his credit. Dr. Fred J. Kingma (see below) has succeeded Dr. Durbin in his former capacity.

Dr. Kingma Succeeds Dr. Durbin as Associate Veterinary Medical Director

Dr. Fred J. Kingma (OSU '38) was appointed associate veterinary medical director, veterinary medical branch, of the Food and Drug Administration's Bureau of Medicine, succeeding Dr. Charles G. Durbin who was made director. He had joined the branch in July, 1957.

From 1955 to 1957, Dr. Kingma directed clinical investigations of veterinary pharmaceuticals in the



Dr. Fred J. Kingma

research department of Abbott Laboratories. Prior to this, he had been a member of the Ohio State University's faculty, where he was professor and chairman of the Department of Veterinary Physiology and Pharmacology.

When time permitted, Dr. Kingma spent his summers in active veterinary practices, including both large and small animals, in Minnesota, Michigan, New Jersey, Illinois, and Ohio. In addition, he spent a summer working with the first artificial breeding association organized in the United States (Clinton, N. J.).

Dr. Kingma was secretary of the Ohio State V.M.A. from 1946 to 1954 and vice-president and secretary of the Fifth District V.M.A. Among several other professional and civic affiliations, he

is also a member of Omega Tau Sigma and Phi Zeta and a charter member of the American Society of Veterinary Physiologists and Pharmacologists.

Inauguration of the Pan American Zoonoses Center

The official inauguration of the Pan American Zoonoses Center in Azul, Argentina, on April 25, was attended by 400 persons. The ceremony included addresses by the Argentine minister of health, Dr. Hector V. Noblia, who represented the



Among the 400 visitors present for the official inauguration of the Pan American Zoonoses Center, Azul, Argentina, in April, were Dr. Constantino Brandariz, dean, School of Veterinary Medicine, University of La Plata, and Dr. Hector P. Camberos, dean, School of Veterinary Medicine, University of Buenos Aires (left and right foreground).

Center's host government, by the director of the bureau, Dr. Abraham Horwitz, and by Raul Peña, Paraguayan minister of health, who represented the delegations from the various other Pan American countries.

Among the visitors to the Center were ambassadors from Cuba, Haiti, and Nicaragua, as well as representatives from several diplomatic corps, international agencies, and educational institutions.

The Center has been in operation for two years, having been founded in August, 1956. Its purpose is to serve the Americas in a broad program of education, research consultation, demonstration, and informative services with regard to the zoonoses (see the JOURNAL, July 1, 1959, p. 81, for more about the Center).

A Change in the Animal Care Panel's Program

A change has been made in the final day of the Animal Care Panel's program for its meeting at

the Sheraton Park Hotel, in Washington, D.C., October 29-31.

Dr. James R. M. Innes (EDN '24), Brookhaven National Laboratories, Upton, Long Island, N.Y., will chairman the session on disease in place of Dr. Robert J. Flynn (MSC '44), Argonne National Laboratories, as reported in the JOURNAL, July 1, 1959, p. 81.

S/WILLIAM I. GAY,
Chairman, Publicity Committee.

Chicago Livestock Shows Merge

The International Livestock Exposition and the International Dairy Show have been merged. They will be combined in the International Amphitheatre, at the Chicago Stock Yards, Nov. 23 to Dec. 5, 1959. Poor attendance at the Dairy Show in October, when Midwestern farmers are busy, was the chief reason for the merger.—*Prairie Farmer* (May 16, 1959): 19.

Dr. James Archibald Named "Veterinarian of the Year"



Dr. James Archibald (right), head of the division of small animal medicine and surgery, Ontario Veterinary College, receives his "Fido" as Veterinarian of the Year from Harry Miller, director of the Gaines Dog Research Center, at the opening session of the American Animal Hospital Association convention, Colorado Springs, May 7 (see the JOURNAL, July 15, 1959, pp. 133-134, for a report of the meeting.) Currently vice-president of the Canadian V.M.A., Dr. Archibald (ONT '49) is also consulting veterinarian to the Charles H. Best Institute of Physiology, University of Toronto Medical School. In 1958, he was elected a member of the Royal College of Veterinary Surgeons.

Connecticut



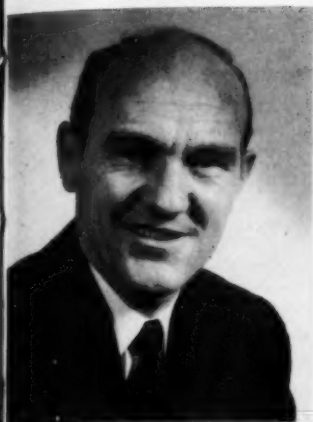
Dr. Ralph V. Westerberg
(ONT '27)

South Carolina



Dr. Glenn J. Lawhon, Jr.
(UP '47)

Alabama



Dr. W. Ross Cryar
(API '51)

Part V

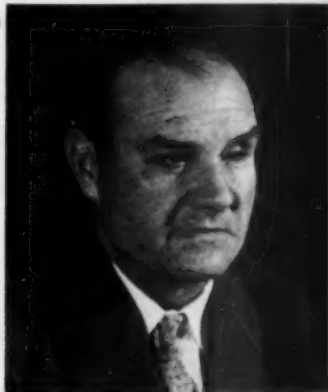
Presidents of Constituent Associations

Wisconsin



Dr. Burr W. Nussdorfer
(OSU '46)

Wyoming



Dr. John A. Wilson
(COL '47)

West Virginia



Dr. John J. Spanabel
(OSU '43)

AMONG THE STATES AND PROVINCES

California

Death of Mrs. Katherine Oldham Sisson.—Mrs. Katherine Oldham Sisson, 88, of Long Beach, died Feb. 20, 1959.

She was the widow of Dr. Septimus Sisson, internationally known professor of veterinary anat-

omy, who was active head of the Department at the College of Veterinary Medicine, Ohio State University from 1901 until 1919. His death occurred in 1924 (see the JOURNAL, June 15, 1959, p. 579, for a report of the dedication of Sisson Hall at Ohio State.



Colorado

The Junior American Veterinary Medical Association of Colorado State University won the College Days parade with the float, at left, on May 2, 1959, in Fort Collins.

The float incorporated the willingness of veterinarians to go where they are needed—with Colorado's centennial motif.

North Dakota

State Association Meeting.—The annual meeting of the North Dakota V.M.A. was held in the auditorium of the New Provident Life Building in Bismarck, June 15-16, 1959.



The Officers presiding over the annual meeting of the North Dakota V.M.A. in Bismarck, June 15-16, 1959, are shown examining a piece of laboratory equipment.

Left to right—Dr. Dean E. Flagg, resident secretary and secretary-treasurer; D. K. Christian, president; George T. Krieger, vice-president.

Among the participants in the scientific portion of the program were: Dr. B. W. Kingrey, Ames, Iowa, who discussed bovine surgery and Dr. V. D. Stauffer, Arvada, Colo., who delivered an address on equine practice.

Presiding over the conference were: Drs. Donald K. Christian, Moorhead, Minn., president; George T. Krieger, Williston, N. Dak., vice-president; and Dr. Dean E. Flagg, Bismarck, N. Dak., secretary-treasurer.

FOREIGN NEWS

Mexico

Dr. Mercado First Veterinarian to Be Named Undersecretary of Agriculture.—For the first time in Mexico, the president of the republic



Dr. Daniel Mercado G

has nominated a veterinarian, Dr. Daniel Mercado G (MEX '22), as undersecretary of agriculture. Dr. Mercado's official designation is chief of the bureau of animal industry, a branch of the government which directs the country's animal production.

Dr. Mercado was formerly dean of the School of Veterinary Medicine and Zootechnics at the University of Mexico.

s/DR. ALFONSO ALEXANDER, Correspondent.

COMMENCEMENTS

Graduating Class, 1959, School of Veterinary Medicine, University of Georgia



Three graduates not shown in the above picture are: J. C. Brown, J. L. Kupper, and W. G. Lord.

Top row (left to right)—F. A. Ingle, E. T. Still, C. H. Little, Jr., R. F. Twilley, D. O. Morgan, T. E. Todd, W. C. Markham, S. Steinberg, S. I. Sragner, J. B. Holland, Jr., J. B. Bostic, Jr.
Second row—J. A. Mayo, D. E. Wood, J. M. Page, G. L. Winters, D. M. Witherspoon, R. M. Edwards, Jr., O. K. Britt, W. T. Derieux, C. J. Snow, J. R. Duncan, R. W. Whiteway.
Third row—B. F. Sherwood, R. E. Walton, D. A. Blackman, G. W. Meckley, D. S. Fincher, R. P. Kwapien, R. D. Whiting, D. E. Goodman, W. H. Pryor, Jr., W. G. Young.
Fourth row—J. C. LeMay, J. W. Watson, H. M. Scott, E. T. Maddox, H. R. Bryant, W. P. Knox, III, D. W. McMillian, A. R. Johnson, G. W. Thornton, Jr., J. P. Bohanan.
Fifth row—W. M. Colwell, F. J. Siccardi, R. R. Lorelle, M. D. Boulware, Jr., S. J. Uhrich, J. M. Kling, J. E. Minchew, J. H. Edwards, C. W. Griffin.

University of Georgia.—At the 1959 commencement exercises of the School of Veterinary Medicine, University of Georgia, the following 53 candidates were presented for the D.V.M. degree:

Daniel Arthur Blackman
John Plunkett Bohanan
James Bennett Bostic, Jr.
Milda Dorath Boulware, Jr.
Olive Kendrick Britt
James Conrad Brown
Hailey Randall Bryant
William Maxwell Colwell
William Thomas Derieux
James Robert Duncan
Julian Hall Edwards
Robert Marvin Edwards, Jr.
Donald Smith Fincher
David Earle Goodman
Clarence Wayne Griffin
John Beverley Holland, Jr.
Frederick Albert Ingle
Austin Rae Johnson
James Malcolm Kling
William Pirrer Knox, III
James Louis Kupper
Robert Paul Kwapien
John Cullom LeMay

Clarence Hepburn Little, Jr.
William George Lord
Richard Ralph Lorelle
Eugene Talmadge Maddox
Wood Calvin Markham
John Allen Mayo
Don Woody McMillian
George William Meckley
John Edsel Minchew
Donald O'Quinn Morgan
John Mauldin Paget
William Harold Pryor, Jr.
Hugh Marion Scott
Bobby Foster Sherwood
Frank John Siccardi
Caleb Jack Snow
Stanley Steinberg
Edwin Tanner Still
Garrett Walchall Thornton, Jr.
Thomas E. Todd
Robert Floyd Twilley
Sara Jane Uhrich

Robert Ellis Walton
John William Watson
Robert William Whiteway
Robert Dean Whiting

Gregory Lee Winters
Don Meade Witherspoon
Derrell Eugene Wood
William Glenn Young

• • •

University of Missouri.—At the 1959 commencement exercises of the School of Veterinary Medicine, University of Missouri, the following 29 candidates were presented for the D.V.M. degree:

William B. Brewster
Eugene M. Ennenbach
Glenn E. Garwood
James E. Herzog
John W. Holden, Jr.
Richard J. Holliday
Richard D. Hull
James R. Meredith
John O. Mozier
Barrie E. O'Bannon
Richard B. Owings
Nicholas E. Palumbo
Robert E. Pemberton
John M. Perry

Pat Riggins, Jr.
Nelson V. Rolf
Gene R. Shipley
Irving Singman
Keith Snider
Ralph Strange
Richard Stringer
Kenneth E. Thompson
Harold A. Treese
William G. Uren
James R. Waddell
Ronald G. Wade
James C. Wilson
Taylor H. Woods

Fowler Young, II

Graduating Class, 1959, School of Veterinary Medicine, University of Missouri



WILLIAM BREWSTER



E. M. ENNEBACH



GLENN E. GARWOOD



JAMES HERTZOG



JOHN W. HOLDEN, JR.



RICHARD HOLLIDAY



RICHARD D. HULL



JAMES MEREDITH



JOHN O. MOZIER

CLASS  1959
SCHOOL OF VETERINARY MEDICINE
UNIVERSITY OF MISSOURI



GARRET E. O'BANNON



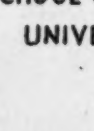
RICHARD OWINGS



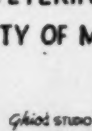
NICHOLAS PALUMBO



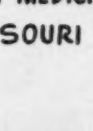
ROBERT PEMBERTON



JOHN PERRY



PAT RIGGINS



NELSON V. ROLF



GENE SHIPLEY



IRVING SINGMAN



KEITH SNIDER



RALPH STRANGE



RICHARD STRINGER



KENNETH THOMPSON



HAROLD TREESE



WILLIAM UREN



JAMES R. WADDELL



RON WADE



JAMES C. WILSON



TAYLOR WOODS



FOWLER YOUNG



HAROLD TREESE



WILLIAM UREN



JAMES R. WADDELL

Top row, left to right—William Brewster, E. M. Ennenbach, Glenn E. Garwood, James Hertzog, John W. Holden, Jr., Richard Holliday, Richard D. Hull.

Second row—James Meredith, John O. Mozier, Barrie E. O'Bannon, Richard Owings.

Third row—Nicholas Palumbo, Robert Pemberton, John Perry, Pat Riggins.

Fourth row—Nelson V. Rolf, Gene Shipley, Irving Singman, Keith Snider, Ralph Strange, Richard Stringer, Kenneth Thompson.

Fifth row—Harold Treese, William Uren, James R. Waddell, Ron Wade, James C. Wilson, Taylor Woods, Fowler Young.



Ohio State University.—At the 1959 commencement exercises of the College of Veterinary Medicine, Ohio State University, the following 67 candidates were presented for the D.V.M. degree:

Henry E. Åkers
George C. Alexander
Thomas H. Barrett
Walter G. Beach
Gerald A. Blakley
Richard R. Bowen
Doyle E. Brauchla
David A. Breiding
Irven W. Brownlee
Judson L. Butler
James K. Caldwell
Clifford J. Callahan
William E. Callahan
Thomas F. Conner

Lloyd E. Davis
Thomas M. Dillman
Richard A. Dirksen
Robert H. Elrod
Gary L. Enold
William H. Feigh
Raymond L. Fish
William J. Garner
Robert G. Geil
Ronald D. Grant
Ralph C. Grosvenor
Frederick A. Guenther
Charles B. Hardin
Fred L. Hess

Luther G. Hinkle
Thomas E. Hooton
Aaron Horowitz
Leo E. Hrdlicka
Gordon L. Hubbell
Roy K. Imhoff
Lewis J. James
Carl E. Kerekes
William A. Keske
Anthony Kiesler
Donald R. Knepper
Richard T. Kost
William C. Krauss
Albert K. Lawrence
Robert F. Leeper
Duane E. Mansperger
Sharon L. Martin
Donald D. Mickey
James E. Mohler

William R. Prafka
James T. Raimonde
Richard Roberts
David M. Robinson
Gilberto Rosado-Carbo
John R. Ross
James S. Sasala
Lawrence A. Schalk
Lyle K. Schultheis
Donald S. Small
John P. Stayanoff
Paul W. Teegardin
Warren D. Thomas
Thomas D. Trap
William A. Verbsky
Robert E. Via
Kenneth G. Watkins
Gary F. Windell
Fred B. Worster

Dale E. Wright

Graduating Class, 1959, College of Veterinary Medicine, Ohio State University



Top row (left to right)—R. Grant, S. Martin, R. Roberts, J. Sasala, W. Prafka.

Second row—C. Callahan, R. Kost, R. Ross, D. Small, L. Schultheis, J. Caldwell.

Third row—R. Dirksen, W. Beach, W. Brownlee, J. Raimonde, L. Janes, W. Thomas, F. Hess, C. Kerekes, P. Stayanoff, G. Blakley, F. Worster.

Fourth row—J. Mohler, D. Robinson, R. Via, G. Alexander, W. Feigh, G. Hubbell, D. Mansperger, R. Imhoff, R. Bowen, D. Breiding, K. Watkins.

Fifth row—L. Schalk, W. Callahan, L. Hrdlicka, H. Akers, F. Guenther, T. Hooton, R. Leeper, R. Fish, T. Dillman, D. Brauchla, T. Trap.

Sixth row—D. Wright, R. Geil, G. Windell, T. Barrett, R. Grosvenor, A. Kiesler, A. Lawrence, G. Enold, T. Conner, R. Elrod, D. Knepper.

Seventh row—W. Verbsky, D. Mickey, P. Teegardin, L. Davis, J. Butler, W. Krauss, W. Keske, W. Garner, C. Hardin, L. Hinkle, A. Horowitz.



Oklahoma State University.—At the 1959 commencement exercises of the College of Veterinary Medicine, Oklahoma State University, the following 38 candidates were presented for the D.V.M. degree:

Elton Ray Baird
John Homer Barton
Byron William Behring
Alton Clarence Caplinger
Nedra Annette Carpenter
Willis Lee Chatham

Rodney Victor Clark
John David Colvert
Russell L. Donathan
John Boyd Dunaway
Robert H. Gengler
Claude Gabriel Gillette, Jr.

William Joseph Guinan
Robert Lee Hartin
J. Fred Johnson
Harold Brison Kimble
Robert S. Laves
Jack Donavon Miller
Boyd DeWitt Mills
Thomas Glenn Mooney
Katharine L. Morrison
Lester George Naito
Albert Melburne Pearson
Judson Howard Pierce, Jr.
Clay Milton Posey

William Henry Pratt
Richard Swift Reese
Alfred W. Renfro
Kenneth Lowell Royse
William Dow Taylor
Robert Stephen Titus, Jr.
Michael Gerard Walsh, Jr.
Wayne Eugene Weber
James Randell Wells, Jr.
Robert Arthur Whitney, II
Jack E. Williamson
Paul Lewis Winsor
Frederick Jerry Woodall

Graduating Class, 1959, College of Veterinary Medicine, Oklahoma State University



Top row (left to right)—J. Fred Johnson, Clay M. Posey, Melburne Pearson, John D. Colvert, Jerry W. Woodall, Kenneth L. Royse, Claude G. Gillette, Jr.

Second row—Jack D. Miller, Robert H. Gengler, Wayne E. Weber, Boyd D. Mills, John B. Dunaway, Robert S. Titus, Alfred W. Renfroe.

Third row—Richard S. Reese, Paul L. Winsor.

Fourth row—J. H. Barton, William D. Taylor, Byron W. Behring, Harold B. Kimble, Robert S. Laves, R. L. Donathan, Michael G. Walsh.

Fifth row—Thomas Glenn Mooney, Judson H. Pierce, R. V. Clark, W. Lee Chatham, Alton C. Caplinger, Ray Baird, Robert A. Whitney, II.

Sixth row—James R. Wells, Jr., Robert L. Hartin, Jack E. Williamson, Katharine L. Morrison, Nedra A. Carpenter, William J. Guinan, Lester G. Naito, William H. Pratt.

Graduating Class, 1959, Ontario Veterinary College, University of Toronto



ONTARIO VETERINARY COLLEGE

CLASS OF 1959



Top row (left to right)—F. P. Baker, J. W. Barnes, J. J. Brown, L. P. Bryant, D. S. Campbell, C. R. Cornell, C. C. Cunningham, L. E. Demetrick, V. Demetrick, C. E. Doige.

Second row—J. C. Fray, C. G. Gardiner, I. G. Giddings, J. G. Green, C. L. Grey, J. Gudmundson, T. J. Henderson, G. A. Irving, H. D. Johnson, J. A. Johnston, T. Kalm.

Third row—G. J. King, N. King, R. C. W. Maidment, W. G. O. W. Marold.

Fourth row—D. M. Meagher, P. F. Mercer, A. E. Miller, F. E. Mongul, S. J. Morrison, D. H. MacDonald, H. R. MacDonald, J. T. McKay, M. N. B. McKie, O. M. Radostits, M. W. Raithby.

Fifth row—A. Skljarevski, R. J. H. Steffens, D. B. L. Tenbergen, R. G. Thomson, D. O. Ulmer, A. L. V. Vanags, F. Vergati, D. Vesselinovitch, W. P. Weber, R. R. Webster, H. Zinger.

Colin Robert Baker was not present when the above picture was taken.

University of Toronto.—At the 1959 commencement exercises of the Ontario Veterinary College, University of Toronto, the following 48 candidates were presented for the D.V.M. degree:

Frank Philip Baker
John William Barnes
Joseph James Brown
Lawrence Pierce Bryant
Colin Robert Cameron
Dermot Seator Campbell
Craig Ruddell Cornell
Charles Cleveland
Cunningham
Lois Elaine Dunlop
Demetrick

Victor Demetrick
Cecil Earl Doige
John Corey Fray
Charles Graham Gardiner
Ivan Guy Giddings
John Gerald Green
Clifford Lindsay Grey
Jon Gudmundson
Thomas James Henderson
George Albert Irving
Henry Donald Johnson

John Armstrong Johnston
Thomas Kalm
Gordon James King
Norma Turnbull King
Reginald Charles William
Maidment
Wolfgang Gottfried Otto
Wilhelm Marold
Dennis Michael Meagher
Paul Frederick Mercer
Archie Edward Miller
Frank Edward Mongul
Stuart Jerome Morrison
D. H. MacDonald
H. R. MacDonald
John Thomas McKay

Malcolm Neil Burns McKie
Otto Martin Radostits
Mark William Raithby
Alexander Skljarevski
Robert James Henry
Steffens
Dick Bernard Lyfhart
Tenbergen
Reginald George Thomson
Donald Oscar Ulmer
Alfred Ludwig Verner
Vanags
Francesco Vergati
Dragoslava Vesselinovitch
William Paul Weber
Robert Roland Webster

Harry Zinger

Graduating Class, 1959, School of Veterinary Medicine, A. & M. College of Texas



GRADUATING SENIORS IN VETERINARY MEDICINE

Texas A&M College

Class of 1959



Top row (left to right)—C. F. Abendorth, Jr., C. C. Allison, G. M. Arnold, Jr., J. P. Arnold, E. B. Avery, E. J. Baronne, J. M. Blain, R. D. Bluntzer, J. C. Boswell.

Second row—D. R. Campbell, L. D. Claborn, D. R. Collins, R. W. Cook, G. E. Cope, L. L. Cross, H. E. Davis, G. R. Eubank, F. A. Fear, C. H. Garrett.

Third row—J. R. Gottlob, Jr., G. M. Gowing, B. J. Gross, T. A. Hennard, Jr., J. E. Hofmann, F. L. Jackson, B. G. Johnson, F. M. Jones.

Fourth row—K. R. Kennedy, K. E. Kinnamon, B. J. Lilly, J. R. Lloyd, A. H. Long, W. W. McCoy, C. N. McDonald, S. A. McDonald, Jr., J. A. McMullan, Jr., R. I. Montgomery, Jr.

Fifth row—C. E. Payne, P. Prause, D. E. Rawson, V. W. Redman, Jr., L. K. Rice, M. L. Risinger, J. D. Ross, J. N. Royal, Jr., T. R. Short, H. E. Smalley, Jr.

Sixth row—M. C. Smith, Jr., D. N. Streater, J. E. Teague, T. R. Thedford, H. K. Tom, Jr., H. K. Turner, G. H. Vincent, S. B. Walker, R. R. Williamson, C. R. Wiseman.

A. & M. College of Texas.—At the 1959 commencement exercises of the School of Veterinary Medicine, A. & M. College of Texas, the following 57 candidates were presented for the D.V.M. degree:

Charlie Frank Abendorth, Jr.
Charles Curtis Allison
George Milam Arnold, Jr.
John Paul Arnold
Ed Blandford Avery
Edgar Joseph Baronne
John Marshall Blain

Robert Dougherty Bluntzer, Jr.
James Cornelious Boswell
Damon Roe Campbell
Larry Dwight Claborn
Donald Reiszner Collins
Raymond Wendell Cook
Gene Everett Cope

Lyle Lester Cross
Harold Eugene Davis
Glenn Ray Eubank
Frank Augustus Fear
Charles Henry Garrett
John Rudolph Gottlob, Jr.
Gene Martin Gowing
Bobby Jack Gross
Tommie Augusta Hennard, Jr.
John Edward Hofmann
Frank L. Jackson
Billy Gene Johnson
Floyd Milton Jones
Kendrick Robert Kennedy

Kenneth Ellis Kinnamon
Billy James Lilly
Jimmy Russell Lloyd
Aaron Herman Long
Warren William McCoy
Charles Newman McDonald
Sidney Addison McDonald, Jr.
James Ashby McMullan, Jr.
Robert Ivy Montgomery, Jr.
Charles Eddie Payne
Preston Prause
Dean Elon Rawson

Vannis Wilbanks
Redman, Jr.
Lowie Keith Rice
Milton Lee Risinger
Joe David Ross

John Newell Royall, Jr.
Thayne Redford Short
Harry E. Smalley, Jr.
Malcolm Crawford
Smith, Jr.

Daron Nicholas Streater
James Edward Teague
Thomas Ray Thedford
Henry Kee Tom, Jr.
Donald Keith Turner

George H. Vincent
Schley Bruce Walker
Ross Robert
Williamson, Jr.
Charles Rogers Wiseman



Graduating Class, 1959, School of Veterinary Medicine, Tuskegee Institute, Alabama



Top row (left to right)—Francis L. Bias, Carl M. Cousins, Albert W. Dade, Orlando J. Fox, Jr., Melvin L. Gaylord.
Second row—James H. Huggins, Jr., Norman L. Gorrell, Jr., Dean T. S. Williams, Reddick M. Goode, George O. Jackson.
Third row—Alfred E. Russell, Peter L. Joseph, Edgar L. Smith, Charles N. Saunders, Jose Suarez-Morales, Marion A. White.

Tuskegee Institute.—At the 1959 commencement exercises of the School of Veterinary Medicine, Tuskegee Institute, Alabama, the following 15 candidates were presented for the D.V.M. degree:

Francis L. Bias
Carl M. Cousins
Albert W. Dade
Orlando J. Fox, Jr.
Melvin L. Gaylord
Reddick M. Goode
Norman L. Gorrell, Jr.

James H. Huggins, Jr.
George O. Jackson
Peter L. Joseph
Alfred E. Russell
Charles N. Saunders
Edgar L. Smith
Jose Suarez-Morales
Marion A. White

DEATHS

Star indicates member of AVMA

Mike A. Arrington (KCV '14), 72, Forrest City, Ark., died May 1, 1959. He had been in ill health for several years.

Dr. Arrington was employed by the state of Mississippi, before he opened a private practice in Forrest City in 1937.

Interment was at Rosehill Cemetery in Brookfield, Mo.

★**Raymond H. Aull** (ISC '15), 67, Dayton, Ohio, died April 18, 1959, after suffering a heart attack while playing golf at the Walnut Grove Country Club.

In addition to his practice, Dr. Aull was also employed by the Division of Animal Industry in the Ohio Department of Agriculture on a part-time basis and served at the Montgomery County Fairs as veterinarian.

Lee Seldon Backus (COR '06), 76, Daytona Beach, Fla., died May 7, 1959.

After graduation, Dr. Backus went to Columbia, Mo., where he joined the University of Missouri's veterinary faculty. He remained at the University until 1925 when he went into private practice. In 1935, he moved to Daytona Beach and operated a small animal hospital until his retirement in 1956.

While in Boone County, Mo., he was well-known as a coon hunter and authority on local superstitions which had hampered the practice of veterinary medicine years ago.

Leonardo E. Chaney (SF '12), 74, Salinas, Calif., a resident of Monterey County for 62 years, died April 21, 1959. He had been in ill health for nine months.

A native of Nevada City, Calif., Dr. Chaney also lived in King City, Calif., for some time. He was a charter member of Guide Dogs for the Blind.

George R. Chase (COR '07), 77, Batavia, N.Y., died April 21, 1959, after being seriously ill for three weeks.

Only recently discharged from the hospital, Dr. Chase was staying at the home of one of his sons, Edwin F. (Pearl St. Rd.), at the time of his death. He had been with the Genesee-Monroe Racing Association for several years.

Theodore O. Clark (ONT '08), 73, a general practitioner from Waverly, Kan., died May 6, 1959, following a three-month illness.

Dr. Clark had lived in Kansas City, Mo., prior to moving to Waverly 13 years ago.

James W. Crouse (UP '15), 72, Lawrenceville, N. J., died May 24, 1959. At the time of his retirement from the New Jersey Department of Agriculture in 1957, he served as assistant director of the Division of Animal Industry, in addition to the posts of chief of the bureau of tuberculosis eradication and of swine disease control.

Dr. Crouse joined the staff of the department in 1921 as a veterinary inspector. He was appointed supervising veterinarian in 1937 and placed in charge of tuberculosis control in 1945. Dr. Crouse had been assistant director of the division of Animal Industry from 1953 until his retirement.

★**Kenneth C. Deason** (KCV '14), 73, Henderson, Texas, died of a heart attack, on May 9, 1959.

A member of a pioneer East Texas family, Dr. Deason had practiced in Nacogdoches until 1932 when he returned to Henderson. One of his brothers, Dr. A. J. Deason (KCV '14) of Henderson, is also a veterinarian.

Felix W. Von Deschwanden (IND '19), Gary, Ind., died April 21, 1959, after an illness of five months.

A native of Switzerland, Dr. Deschwanden settled in Kansas City, Milwaukee, and Chicago before moving to Gary in 1936. He operated a small animal hospital there and was a member of the Gary Humane Society for many years.

Joseph C. Harland (CVC '06), 80, Mukwonago, Wis., died April 28, 1959. He had been an invalid since 1956, due to injuries suffered in an automobile collision.

A pioneer in the battle against bovine tuberculosis in Waukesha County, Dr. Harland had practiced in Mukwonago since 1906. He was extremely active in civic affairs and was commissioned postmaster there from 1936 to 1954 and a director and then vice-president of the Citizen's National Bank until 1956.

Dr. Harland had been elected to "Who's Who in America" but had declined the nomination.

★**Frank L. Stein** (CVC '12), 73, Webster, N.Y., former owner of the Central Small Animal Hospital in Rochester, died April 22, 1959, of multiple myeloma, after a two-year illness. He was made a life member of the AVMA in 1955.

After graduation, Dr. Stein practiced in Gasport, N.Y., for a time. During World War I, he served with the former Bureau of Animal Industry in Chicago and Buffalo as a meat inspector. He then opened the Central Small Animal Hospital in Rochester where he remained until his retirement in 1941.

In the later years, he and his wife spent much of their leisure time fishing in Canada and horseback riding on their farm in Webster.

Charles E. Stuck (OSU '44), 41, mayor of Mt. Victory, Ohio, was pronounced dead on arrival at the San Antonio Hospital in Kenton, April 18, 1959, following a heart attack suffered at his home.

★**J. E. Williams** (KSC '21), 61, Yates Center, Kan., died at his home following a short illness, April 29, 1959.

Spending most of his life in Neosho Falls, Dr. Williams also operated a rural mail route there. He moved to Yates Center in 1951.

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SODIUM



**A proven, outstanding ultrashort-acting
intravenous anesthetic for**

**DOGS
CATS
HORSES
CATTLE
SWINE**

The use of SURITAL in animals provides smooth, rapid induction, free of excitement or irritability with early, uncomplicated recovery.

Complete dosage information and professional literature available on request.

SURITAL sodium (thiamylal sodium, Parke-Davis) is supplied as follows: 0.5 Gm., 1.0 Gm., 5.0 Gm., and 10.0 Gm. ampoules (Nos. 263, 264, 265, 266); 1.0 Gm. Steri-Vials[®] (No. 64) (rubber-diaphragm-capped vials); 1.0 Gm. Steri-Vials (No. 64) with Diluent; 5.0 Gm. and 10.0 Gm. Steri-Vials (Nos. 122 and 123).



Department of Veterinary Medicine
PARKE, DAVIS & COMPANY
Detroit 32, Michigan



when
urinary
tract
infection
is suspected

FURADANTIN[®] ORA-BOLS[™]

brand of nitrofurantoin **veterinary**

new, exclusive veterinary dosage form
pleasant tasting • easily administered • readily retained

In small-animal urinary tract infections, FURADANTIN swiftly achieves high bactericidal concentrations in the urine, and in a high percentage of cases eliminates incontinence, dysuria, frequency, and straining. Of 32 dogs and cats recently treated,¹ 29 showed rapid clinical improvement. Often, there is marked improvement by the 4th day and complete recovery in 7 to 14 days.²

In canine tracheobronchitis, FURADANTIN given for 5 days stopped the coughing in 95% of 75 cases; in some dogs, complete symptomatic relief was gained in 48 hours.³

COMPOSITION:

Each FURADANTIN ORA-BOLS provides FURADANTIN 50 mg. in an excipient containing dextrose.

SUPPLIED:

Bottle of 100 scored 50 mg. ORA-BOLS. FURADANTIN also is available as: 10 mg. and 100 mg. scored tablets, bottles of 100, and Oral Suspension containing 5 mg. FURADANTIN per cc., bottle of 60 cc.

REFERENCES: 1. Mosier, J. E., and Coles, E. H.: Vet. Med. 53:649 (Dec.) 1958. 2. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956. 3. Mosier, J. E.: Vet. Med. 52:445 (Sept.) 1957.

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What Is Your Diagnosis?

Because of the interest in veterinary radiology, a case history and radiographs depicting a diagnostic problem are usually published in each issue.

Make your diagnosis from the picture below — then turn the page ►

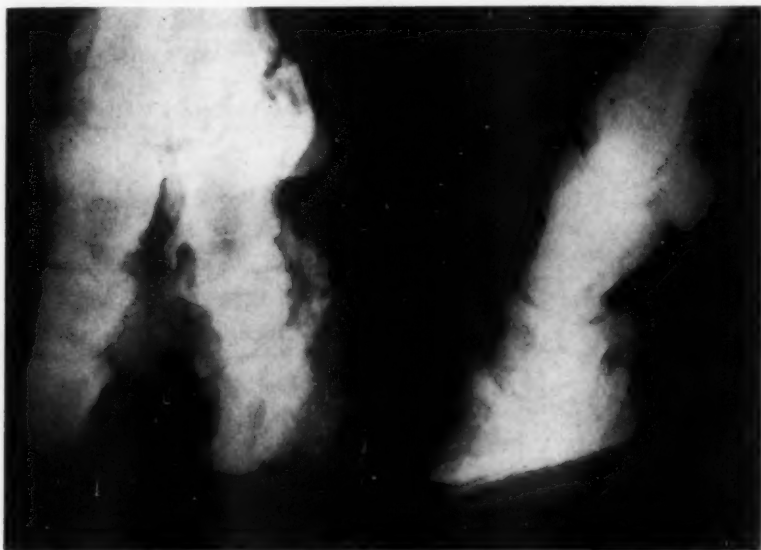


Fig. 1—Anteroposterior and lateral radiographs of the right forefoot of the bull.

History.—A 7-year-old Hereford bull had been chronically lame in both forefeet for two to three years. Penicillin therapy temporarily relieved the lameness. The wall of the right, fore, medial hoof had grown under the sole. Anteroposterior and lateral radiographs were taken of the right forefoot.

Here Is the Diagnosis

(Continued from preceding page)

Diagnosis.—Chronic infectious arthritis of the digits of the forefoot of a bull, due to "foot rot," with extensive new bone proliferation.

Comment.—Extensive bone proliferation, starting on the distal extremities of the large metacarpal bones and extending throughout the digits, obscures some of the joints. A radiograph of an affected foot in chronic bovine lamenesses may show the client why the condition cannot be permanently relieved.

This report was submitted by William D. Carlson, D.V.M., Ph.D., radiologist, College of Veterinary Medicine, Colorado State University, Fort Collins.

Our readers are invited to submit histories, radiographs, and diagnoses of interesting cases which are suitable for publication.

Gestation Period of Chimpanzees

The average length of the gestation period in 118 births in a colony of chimpanzees was 226.8 days with a range of 196.0 to 260.0 days. Six (5%) of the births were twins, a higher rate than in man.—*Science* (April 10, 1959): 959.

Parturition in a Marsupial

A colony of brush-tailed opossum, *Trichosurus vulpecula* Kerr., was studied in Sidney, Australia. Usually only 1 young is raised each year. The estrous cycle was 21 to 30 days but did not occur when the female had young in her pouch; if the young were removed, estrus occurred in four to ten days. The gestation period was 17 to 21 days.

Parturition was observed in 1 female. After showing signs of restlessness, she assumed a sitting position with the hindlimbs partly extended. Fluid exuded from the urogenital opening and an embryo, free of fetal membrane, was expelled but fell through the wire mesh floor of the cage. The female was then held on her back, horizontally, and the young was returned to the region of the urogenital opening. It turned in the direction of the pouch and crawled through the fur by movement of the forelimbs, traveling 7 cm. in seven minutes. Another 5 minutes elapsed before it disappeared into the pouch.

The female weighed 2,030 Gm., the young

weighed 0.20 Gm. and was 13 mm. long. The ratio in weight of newborn animals to their dams varies from 1:60,000 for kangaroos, to 1:3 for some bats.—*Nature* (Feb. 28, 1959): 622.

Peck-Order and Performance of Hens

When hens of six diverse strains were kept together, it was found that their social order depended more on individual characteristics than breed recognition. Hens high in the order usually matured earlier, were heavier at 5 months of age, and gained less thereafter. They ate more often, had a higher egg production the first four months, and a better livability.—*Poult. Sci.* (Jan., 1959): 95.

Estrous Periods in Dairy Heifers

Since artificial insemination failures could be due to breeding too soon or too late, 277 estrous periods in 139 subfertile heifers were studied. The heifers were observed at 8 a.m., 4 p.m., and at midnight, with standing for mounting used as an indication of estrus.

There was no significant difference (81 to 99) in the number which first showed heat during each of those eight-hour periods. The length of estrus varied from eight to 32 hours, with 92.8 per cent lasting 16 to 24 hours.—*A. I. Digest* (April, 1959): 24.

for **MASTITIS** of
dry and lactating cows

NEW SQUEEJET ^{T.M.*}

single-dose dispenser for

FURACIN® **SOLUTION** *veterinary*

brand of nitrofurazone



- delivers one full dose ● is discarded after using
- saves time ● is convenient, especially when a number
- of cows are to be treated ● unique package

*design patented

FURACIN has been shown to be strikingly effective in controlling mastitis under field conditions.^{1,2} Of 7,123 lactating cows with acute mastitis, fair to excellent results were obtained in 5,597 (78%). Of 3,418 dry cows which had had mastitis during their previous lactating period, fair to excellent results were obtained in 3,104 (90%).

SUPPLIED A water-miscible liquid of FURACIN 0.2% in polyethylene glycol and water. Single-dose SQUEEJET disposable dispenser of 30 cc. Still available, bottles of 500 cc. with rubber stopper and 1 gal.

1. Mires, M. H., and Chadwick, R. H.: *Vet. News* 10:3 (Jan.-Feb.) 1947. 2. Mires, M. H.: *J. Am. Vet. M. Ass.* 117:49 (July) 1950.

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Joint AVMA-Pan American Meeting

Kansas City, August 24-27

Exhibits

■ The joint AVMA-Pan American Veterinary Convention promises to be the largest veterinary meeting ever to be held in the United States.

More than 100 exhibits by commercial companies will be on display for the record attendance expected. These companies have contributed generously toward making this meeting the largest—and perhaps the best—ever held in the western hemisphere and the world.

A greater variety of new products for surgery, treatment, and confinement of animals will be displayed, plus helpful literature and practice tips.

In addition to the commercial exhibits, there will also be 30 scientific and educational displays. A special feature of the scientific exhibits will be The Cell by the Upjohn Company. This exhibit, used at the American Medical Association convention this year, was an outgrowth of the success of the 24-foot Cell model which is permanently located in the Museum of Science and Industry in Chicago.

The huge Cell model created a great deal of interest, and many requests were received to show it at various meetings and special exhibits. The big model, however, was too difficult to transport, and it required a vast exhibit area.

To satisfy this demand, a smaller and more portable model six feet in diameter was constructed. In constructing this smaller model, it has been possible to render certain structures more accurately and to incorporate the latest thinking on cell structure. Leading cytologists gave a great deal of their time in solving the problem of converting electron microscopic findings into plastic.

The cell is represented as static, whereas in life it is in a constant state of flux. To compensate for this difficulty, motion pictures of living cells will be shown, in juxtaposition to the model. In this way, it will not only be possible to show the dynamic nature of living cells, but also the great diversity of their shapes and sizes.

Some of these movies have been taken at normal speed and will show the various cells as they might appear to an observer looking through a microscope. Others have been taken by means of the time lapse technique, which collapses the occurrences of several hours or even days into a few minutes.

This latter technique is particularly valuable in demonstrating the growth and development of



The Cell, by the Upjohn Company, on display at the Museum of Science and Industry in Chicago. A smaller version, technically improved, will be on exhibit at the AVMA Convention in Kansas City.

cells and their division. Some of the subjects to be covered are: the growth of bacteria and their destruction by another antibiotic, the effect of a virus on a colony of cells growing in tissue culture, and the growth and division of cancer cells in tissue culture and the effect of antimetabolites upon them.

The exhibit was designed by Will Burtin and was built by The Displayers, Inc., who built the 24-foot cell. The movies are by well-known nature photographers Roman Vishniac and John Ott.

The exhibit "Internal Parasites of Dogs" by Wilhelm D. Meriwether, National Science Fair winner of the first AVMA Science Youth Award, will also be on display in this area. Wilhelm and his father, an elementary school principal in Charleston, S. Car., will attend the Convention as guests of the AVMA.

An exhibition of late 18th and early 19th century works on veterinary medicine and farriery, from collections of members of the American Veterinary Historical Society, will be displayed. Dr. J. F. Smithcors, president of the society, has published "The Evolution of the Veterinary Art" and is working on a second veterinary history book.

The Ellin Prince Speyer Hospital for Animals, and the Margaret M. Caspary Institute for Veterinary Research will have exhibits of interest to small animal practitioners and research workers.

An exhibit on rabies will be provided by the Veterinary Section of the U.S. Public Health Service's Communicable Disease Center.

Housing and Registration

Advance registrations have been coming in at an accelerating pace. The Hotel and Housing Bureau of the Convention City recommends that advance arrangements for housing during the convention be made as early as possible to prevent last-minute disappointments. A list of the hotels and their rates with a location map will be found on p. 49 of the advertising section. A registration form is included for your convenience.

Please indicate a first, second and third choice of hotels, in case your first choice hotel is already full.



Convention Information

Registration Hours

Registration opens at 10:00 a.m., Sunday, August 23, in the Municipal Auditorium and will remain open until evening to permit as many as possible to register before the Monday rush.

Daily registration, thereafter, from 8:30 a.m. to 5:00 p.m.

Always Wear Your Registration Badge

The Official Badge issued to you at the Registration Desk will admit you to all convention functions not covered by special tickets. Uniformed ushers in attendance outside the various meeting rooms and exhibit hall have been instructed to refuse admission to persons not having registration badges.

Distinctive badges will be issued as follows: member, guest, exhibitor. The Women's Auxiliary desk will issue distinctive tags to Auxiliary members.

Exhibitor Prizes

The American Veterinary Exhibitors Association is again making awards to a lucky veterinarian and a veterinarian's wife at a drawing to be made on Wednesday, August 26, during the President's Reception and dance. Details of how to qualify for the prizes will be issued at the Registration Desk.

Tickets for Alumni Dinners and Special Events

Distinctive tickets will be issued to registrants for each complementary function requiring one.

Alumni Dinners

Tickets should be purchased *immediately after registration*, at the Ticket Sales Desk. The exact locations of the various college dinners will be announced on bulletin boards and elsewhere on Tuesday, August 25.

Wives, children, and guests of alumni are invited to these dinners, but each must have a ticket.



Union Station, Kansas City.

Purchase tickets early to avoid disappointment, as the capacity for some alumni groups will be limited and ticket sales must be concluded by 1:00 p.m., August 25.

Tickets for the various special events will also be sold at the Ticket Sales Desk.

Noonday Luncheon Club Meetings

A few of the civic and service club meetings in Kansas City are listed below for the benefit of members who want to maintain their attendance records.

KIWANIS CLUB—Thursday, Hotel Continental

LIONS CLUB—Tuesday, Hotel Muehlebach

OPTIMIST CLUB—Friday, Hotel Muehlebach

ROTARY CLUB—Thursday, Hotel Muehlebach

SERTOMA CLUB—Tuesday, Hotel President

For information on other clubs, please call the Kansas City Visitors and Convention Bureau, Baltimore 2-2424.

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"Across the Wide Missouri," Famous in American folk ballads, the Missouri rolls majestically across the rich Kansas plains on its way to the Mississippi.



Council on Veterinary Service

Council Hears Denver Plan for Emergency Service

The AVMA Council on Veterinary Service met in Chicago on April 12-13, 1959. Members present were:

R. O. Anderson, Elkhorn, Wis.
C. A. Bjork, Portland, Ore.
F. T. Candlin, Denver, Colo.
A. H. Groth, Columbia, Mo.
J. O. Knowles, Miami, Fla.
J. L. McAuliff, Cortland, N.Y.
P. E. Madsen, Sheridan, Wyo.
A. C. Misener, Chicago, Ill.
V. D. Stauffer, Arvada, Colo.
Kenneth Whittington, Memphis, Tenn.

The Council heard a report on emergency services and studied in detail a description of the Denver plan whereby veterinarians, working through their local association, have successfully provided emergency service in a large city. Here are some details of the plan.

Arrangements were made with a local telephone answering service to handle calls from pet owners unable to locate their own veterinarians for emergency night and holiday service. A special telephone number of the service was listed in the telephone directory in the form of a block ad in the veterinary section. A survey of the veterinary hospitals had disclosed that the emergency service was needed from 7:00 p.m. on weekdays, 7:00 p.m. to 8:00 a.m. on Saturdays, and 6:00 p.m. to 8:00 a.m. on Sundays and holidays. The local veterinary association pays \$12.00 monthly for the answering service during these hours, \$5.15 monthly for special telephone equipment at the answering service, and \$11.00 monthly for directory space. Each month, the association secretary sends out a duty roster and the participating veterinarian is responsible for either servicing the calls on the designated day or arranging for a substitute. He renders the service at his own hospital and charges his regular "night fees."

The client seeking emergency veterinary service during the designated hours first phones his own veterinarian, but if the latter is unavailable the client is advised (either by someone answering the doctor's phone or by a mechanical answering device) to call the emergency number. The veterinarian on emergency duty, having answered the phone call and having decided that an emergency exists, directs the client to bring the patient to his office, renders the appropriate service, levies his customary fee, and for further service refers the client to his regular veterinarian, who will have received a detailed report on the following morning.

The Council at this meeting continued its work to revise the Memorandum of Understanding agreed upon by the American Humane Association

(A.H.A.) and the AVMA in 1928. The revision, when complete, will outline the functions of local humane associations and the nature of their relationship to the veterinarian. Even if the revision is acceptable to both the A.H.A. and the AVMA, however, it will serve only as a guide and would not be binding on constituents of either.

The Council also (1) heard a report on a proposed AVMA-A.A.H.A. Receptionist Booklet and considered a proposed form of publication, (2) studied the problem of veterinary ownership of biological and pharmaceutical supply firms and prepared a statement of opinion to be incorporated in the annual report of the Council, and (3) considered the problem of penicillin in market milk and the effect which some methods of controlling it would have on the practice of veterinary medicine.

Delegates Will Hear Report on Dog Shows

As part of the annual report of the Council on Veterinary Service, the report of its Committee on Dog Shows will be presented to the House of Delegates meeting in Kansas City on August 21-22. The report of the Committee will be essentially as follows:

A recent change in the "Rules Applying to Registration and Dog Shows" of the American Kennel Club has resulted in a more comprehensive explanation of the duties and responsibilities of show veterinarians.

One drastic change empowers the Bench Show Committee of an all breed club or a specialty club to determine whether the show shall be an "examined show."

An "examined show" is one at which each dog is subject to a health inspection by one of the show's veterinarians before being allowed to enter a show's premises.

The new rules and regulations are an improvement over the old ones insofar as defining the duties of show committees and veterinarians in relation to health inspection and physical condition of the dog is concerned.

The advisability of making the "examined shows" optional with respect to requiring vaccination against the common communicable diseases of dogs may be open to question.

The committee realizes that most owners of valuable dogs recognize the importance of protecting their charges from communicable diseases by routine vaccination, but leaving this decision to the discretion of the individuals may prove to be an unwise procedure.

It is noteworthy that the new regulations provide for ample space for the "veterinarian's enclosure," and spell out the equipment and help which must be supplied to the veterinarians by the club when an "examined show" is held.

The wisdom of some of the directives in the new regulations is probably not within the province of the committee to decide. The committee does feel that it is important for all veterinarians in small animal practice to become familiar with the new regulations. Furthermore, they should have a standard and uniform procedure to follow when called upon to attend an "examined show." With this thought in mind, the following procedures are suggested:

Wherever possible, the service should be obtained under the jurisdiction of the local veterinary society. There are problems to be encountered here. Unless the society is well organized and well supported, a tremendous disaster may result. On the other hand, the committee has reports of excellent service rendered by local societies; indeed, some of them attribute their formation to the demands made upon the local practitioners by dog show participation. Sufficient personnel should be on hand to prevent undue delay of entering animals. In large shows, a minimum of four veterinarians may be required during rush periods. This problem has been solved in some areas by veterinarians working in shifts of two or more hours. Assignments are made well in advance, and those unable to attend must arrange for their own substitutes.

Minimum requirements of examination are a visual examination and a temperature recording. A maximum temperature of 103 F. is allowed for admission if the animal appears to be normal. In the event that a temperature recording is higher than 103 F., a more thorough examination should be made. If no conclusive determination can be made from such examinations, then the dog must be retained for 30 minutes, and a second temperature record made. If the temperature fails to drop below 103 F., the dog is to be rejected.

Any animal with signs of a communicable disease transmissible under usual conditions of exhibition should be rejected.

After handling each dog, precautions should be taken by examining veterinarians with respect to disinfection of instruments, tables, and hands. Attention is directed here to the regulations which require the use of rubber gloves if an internal examination of the mouth of a dog is made by the veterinarian. Furthermore, the authors of the regulations have seen fit to designate the disinfectants which are to be used; namely, Zephiran Chloride or Roccal. The concentration required is not stated.

A prescribed fee is to be charged at all times and is to be as reasonable as possible. In the event that a society wishes to donate its services, it is recommended that the standard fee still be charged and then donated to the club in the name of the veterinary society.

An earnest effort should be made by all attending veterinarians to help make the show a success by all means possible, consistent with safe and efficient medical principles. It should be remembered that friendly and willing cooperation can be an effective public relations effort.

Spanish Conversation

Hable Español?

Since the AVMA Convention in Kansas City will be held jointly with the Pan American Congress, with approximately 400 Spanish-speaking veterinarians and visitors, the JOURNAL is currently carrying phrases of simplified Spanish conversation.

Como se dice...? How do you say...?
KO-mo say DEE-say...?

Tiene Usted mucha Are you very
hambre? hungry?

Tee-AYN-ay oos-
TETH MOO-cbo
AM-bray?

Tiene Usted mucha Are you very
sed? thirsty?

Tee-AYN-ay oos-
TETH MOO-cba
sayd?

Quiere Usted acom- Do you want to
panarme al res- come with me to
taurante... the restaurant...

Kee-AIR-ay oos-
TETH a-kom-pan-
YAR-may al res-
tow-RAN-tay...

... al museo ... the museum

... al moo-SAY-O

... a la farmacia ... the drug store

... a la far-ma-SEE-a

... al teatro ... the theater

... al tee-AH-tro

... al cinema? ... the movies?

... al SEE-ne-ma?

Donde esta el Where is the shop-
centro? ping district?

DON-day es-TA el
SEN-tro?

Esta bastante cerca Is it within walking
para ir a pie? distance?

Es-TA bas-TAN-tay
SER-ka PA-ra ir a
PEE-ay?

Quiere Usted cenar Do you want to
con migo? have dinner with
me?

Kee-AIR-ay oos-
TETH say-NAR
kon MEE-go?

Vamos de priza! Let us hurry!

BA-mos day PREE-
sa!

elations

A montage of local newspaper coverage of the 94th Annual Meeting held in Cleveland, Ohio.

rural weeklies through Community Press Service's column "Farm Topics."

A collection of radio stories based on abstracts and program events will be mailed to members of the National Association of Television and Radio Farm Program Directors.

Press Attendance

Mr. Norman Kraeft, farm program director of station WGN and WGN-TV, Chicago, will attend the meeting to tape interviews with prominent veterinarians and scientific speakers.

Mr. Mike Bay, livestock editor of *Successful Farming*, will also attend for the purpose of obtaining background information and material for features in this major agricultural publication.

These men have confirmed their attendance. Other editors of major farm publications have been invited, including several editors of livestock and farm magazines in Missouri and Kansas.

Mr. N. E. Paton, Jr., public relations counsel to the Missouri and Kansas V.M.A. will also be in attendance at the press room to assure news service and coverage in the host states.

Dr. C. M. Cooper and the convention publicity and public relations committee will be on hand in the press room to assist in serving members of the press wishing to interview veterinarians, and to check on the technical accuracy of material prepared there.



Everett "It's a Beautiful Day in Chicago" Mitchell, long-time master of ceremonies for NBC's "National Farm and Home Hour," will present preview highlights of the Joint AVMA-Pan American Meeting on Saturday, August 22, during the noon hour.

Norm Kraeft (left), farm service supervisor, station WGN and WGN-TV, Chicago, and Illinois chairman of the Farm-City Week Committee, will be on hand to interview speakers, officers, and award winners at the AVMA Convention. Here he is speaking with O. L. Hogsett, extension safety specialist from the University of Illinois College of Agriculture.



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Against the widest range of pathogens

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protozoa

pathogenic fungus

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History of the AVMA

Little is on record concerning the activities of the Association during its early years. The

1865 original minute book, containing the records of the meetings from 1863 to 1894, apparently has been lost. With the establishment of the *American Veterinary Review* in 1877, the proceedings of the meetings are reported in some detail. Prior to this time, the principal source of information is a review of the first 25 years' activities given by Dr. Rush Shippen Huidekoper as his presidential address in 1889.

The 1865 meeting was held at Young's Hotel in Boston, where the semiannual meetings were held for many years. President A. S. Copeman presided and read a paper on "Philosophy of the Sciences." The first new member, Henry Lawrence, was admitted. The new officers elected were: Charles M. Wood of Massachusetts, president; Charles Burden of New York, secretary; and Elisha F. Thayer of Massachusetts, treasurer. All three were self-educated practitioners; Dr. Burden later qualified at the New York College of Veterinary Surgeons.

An interesting sidelight on the relation of the American Veterinary Association (of Philadelphia) to the U.S.V.M.A. has been presented by L. A. Merillat in his "Historical Sketches and Memoirs," which appeared in the *JOURNAL* from June, 1946, to December, 1947. The *JOURNAL* for July 1, 1958, in editorializing on "the vagaries of history and the notions of historians," suggests that 1854 — the date of founding of the A.V.A. — might be considered the birthdate of the AVMA.

It is a matter of record that as early as 1859, the A.V.A., through its founder and moving spirit, Robert Jennings, urged the formation of a national association. Prior to this time, however, the main concern of the A.V.A. appears to have been the promotion of Dr. Jennings' ill-fated Veterinary College of Philadelphia. Having failed repeatedly to gain the desired support for this venture, it would appear that he turned to the promotion of a national association as an outlet for his efforts, in what would seem to have been a sincere desire to elevate the veterinary profession. Although the next record of action by the A.V.A. appears to have been a call for a meeting in New York, issued in March, 1863, curiously enough, W. Horace Hoskins states in an un-



Boston in the late 1860's, site of two annual and 20 semiannual meetings up to the year 1890.

published address that the first meeting of the U.S.V.M.A. (A.V.A.) was held in Philadelphia in 1862. It would seem to be more correct to consider this as merely the eighth annual meeting of the A.V.A., and that the true founding date of the U.S.V.M.A. was June, 1863.



A. S. COPEMAN, V.S., second president of the U.S.V.M.A., was a self-educated practitioner at Utica, N.Y., for many years, and in 1855, became professor of pharmacy at the Boston Veterinary Institute. He contributed to the *American Veterinary Journal*, and for seven years was veterinary editor of the *Spirit of the Times*. In 1864, he became professor of theory and practice in the New York College of Veterinary Surgeons, but after a few years, he retired in favor of a large and lucrative practice in New York City. He amassed a fortune, but lost it through a series of family troubles, and in 1876 took his own life.

Dr. Copeman was characterized as "a hard worker, a lover of the microscope, and a fluent writer." In speaking at the opening exercises of the N.Y.C.V.S. in 1865, he stated: "The science of veterinary medicine, as it is now beginning to be understood, is a science that has a far wider application and a far nobler mission than the limited duty of leading the sick animal back to health. . . . The great problem of veterinary medicine is not so much how to cure a particular case of pneumonia or of fever, but how to prevent the outbreak of pestilence, to discover and to avert all the causes of epizootic and enzootic diseases; in a word, how to preserve the health of domestic animals and thereby increase the wealth of the nation."

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(Stuttgart disease)

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Used *therapeutically* against a specific infection, Quatra Sera simultaneously protects against possible exposure to other indicated diseases. Used in conjunction with antibiotics and other standard forms of treatment, Quatra Sera is a valuable aid in the therapy of canine distemper, infectious canine hepatitis and leptospirosis (both types); as well as fox distemper and encephalitis.

Used *prophylactically*, Quatra Sera provides convenient, effective "4 in 1" protection for dogs en route to shows or field trials . . . for dogs of unknown immunity status when placed in hospital or kennel . . . for dogs unsuited for vaccination because of debility . . . and for puppies too young to be successfully vaccinated.

FOR ADDED PROTECTION, against important secondary bacterial invaders, Quatra Sera also contains the antigens of *Leptospira canicola*, *Leptospira Icterohaemorrhagiae*, *Salmonella typhimurium*, *Brucella bronchiseptica* and hemolytic streptococci.

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SIN-JEX

... good immunity against canine distemper and infectious hepatitis at the same time with a single injection. Sin-jex is the first successful combination of a vacuum dried, modified live virus distemper fraction (chick embryo origin) with a killed virus hepatitis fraction as diluent. Sin-jex is instantly reconstituted into a fine homogeneous suspension which passes easily through a 22 gauge needle, and produces immunity in less than 2 weeks. Supplied in 6 x 3 cc.—1 dose vials.



FEMULGEN

... single-injection vaccine for immunization against feline distemper (feline infectious enteritis, malignant panleucopenia, infectious feline agranulocytosis, etc.). Femulgen is a homologous vaccine, prepared from the tissues of young susceptible cats inoculated with virulent feline distemper virus. This virus is extracted, inactivated with formalin and suspended in an oil emulsion. Supplied in 5 x 1 cc.—1 dose vials, with disposable syringe.

RABIES VACCINE

... both phenolized and chick embryo origin, for positive immunization against rabies for a period of one year. Supplied in 5 x 3 cc.—1 and 10-dose vials for live virus (chick embryo origin), 50 cc. vials for phenolized suspension.



CANINE DISTEMPER VACCINE

... modified live virus (chick embryo origin) for immunization against distemper in dogs. Supplied in 6 x 2 cc.—single-dose vials.



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COMING MEETINGS

Notices of coming meetings must be received 30 days before date of publication.

American Association of Veterinary Bacteriologists. Annual meeting. Division of Veterinary Medicine. Iowa State College, Ames, Iowa, Aug. 22, 1959. C. H. Cunningham, Michigan State University, College of Veterinary Medicine, East Lansing, secretary.

Ninety-Sixth Annual Meeting, American Veterinary Medical Association, and Third Pan American Congress of Veterinary Medicine. Joint meeting. Kansas City, Mo., Aug. 23-27, 1959. H. E. Kingman, Jr., executive-secretary, AVMA, 600 S. Michigan Ave., Chicago 5, Ill. B. D. Blood, secretary-general, Directing Council, Pan American Congress of Veterinary Medicine, P.O. Box 99, Azul, F.C.N.G.R., Argentina, S.A.

Washington State Veterinary Medical Association. Annual meeting. Desert Inn, Richland, Aug. 31 to Sept. 1, 1959. Mr. Robert M. Ford, 2406 Boyer Ave., Seattle 2, Wash., executive secretary.

Colorado Veterinary Medical Association. Annual convention. Shirley Savoy Hotel, Denver, Colo., Sept. 3-4, 1959. Gail H. Gilbert, 5500 Wadsworth Ave., Arvada, executive secretary.

Electron Microscope Society of America. Seventeenth annual meeting. Ohio State University, Columbus, Sept. 9-12, 1959. Sydney S. Breese, Jr., Plum Island Animal Disease Laboratory, Greenport, L.I., N.Y., program chairman.

New York State Veterinary Medical Society. Annual meeting. Grossinger's, Grossinger, N.Y., Sept. 16-18, 1959. F. H. Fox, chairman.

South Dakota Veterinary Medical Association. Annual meeting. Sheraton-Johnson Hotel, Rapid City, S. Dak., Sept. 17-18, 1959. Glenn E. Duncan, Marion, secretary.

New Mexico Veterinary Medical Association. Annual meeting. Western Skies Hotel, Albuquerque, N. M., Sept. 21-22, 1959. E. R. Leslie, 907 Alamosa, Carlsbad, N.M., secretary.

Eastern Iowa Veterinary Association, Inc. Forty-sixth annual meeting. Roosevelt Hotel, Cedar Rapids, Oct. 15-16, 1959. C. B. Thayer, Medical College, State University of Iowa, Iowa City, Iowa.

Interstate Veterinary Medical Association. Annual meeting. Sioux City, Iowa, Oct. 22-23, 1959. Dr. Don Rubel, 3209 39th St., Sioux City, secretary.

Animal Care Panel. Annual Convention. Sheraton Park Hotel, Washington, D.C., Oct. 29-31, 1959. William I. Gay, Animal Care Panel, 2101 Constitution Ave., Washington 25, D.C., publicity committee chairman.

Regularly Scheduled Meetings

ALABAMA—Central Alabama Veterinary Medical Association, the first Thursday of each month. James L. Chambers, 4307 Normanbridge Rd., Montgomery, Ala., secretary-treasurer.

Jefferson County Veterinary Medical Association, the second Thursday of each month. Dan P. Griswold, Jr., 714 S. 39th St., Birmingham, secretary.

Mobile-Baldwin Veterinary Medical Association, the third Tuesday of each month. Cecil S. Yarbrough, 4121 U.S. 90 West, Mobile, Ala., secretary.

Northeast Alabama Veterinary Medical Association, the second Tuesday of every other month. Leonard J. Hill, P.O. Box 761, Gadsden, Ala., secretary-treasurer.

ALASKA—Anchorage Group of the Alaska V. M. A., the last Wednesday of each month at Fort Richardson Officers' Club or Thompson's Restaurant 6th and I Streets, Anchorage. Alas. Lt. Colonel E. H. Akins, Surgeon's Office, U.S.A.R.A.L., Fort Richardson, Alas., secretary to the Alaska V. M. A.

ARIZONA—Central Arizona Veterinary Medical Association, the second Tuesday of each month. J. W. Langley, Jr., P.O. Box 5013, Phoenix, Ariz., secretary.

Southern Arizona Veterinary Medical Association, the third Wednesday of each month at 7:30 p.m. Gwyn Chapin, 2215 E. Calle Vista, Tucson, Ariz., secretary.

ARKANSAS—Pulaski County Veterinary Medical Society, the second Tuesday of each month. Harvie R. Ellis, 34 Belmont Drive, Little Rock, Ark., secretary-treasurer.

CALIFORNIA—Alameda-Contra Costa Veterinary Medical Association, the fourth Wednesday of Jan., March, May, June, Aug., Oct., and Nov. John S. Blackard, 420 Appian Way, Richmond, Calif., secretary.

Bay Counties Veterinary Medical Association, the second Tuesday of February, April, July, September, and December. Herb Warren, 3004 16th St., San Francisco, Calif., executive secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Paul S. Chaffee, 2333 McKinley Ave., Fresno, Calif., secretary.

Humboldt-Del Norte Counties Veterinary Medical Association, the second Tuesday of January, May, September, and November. Dr. M. Lunstra, P. O. Box 734, Eureka, Calif., secretary-treasurer.

Kern County Veterinary Medical Association, the first Thursday evening of the month. James L. Frederickson, 17 Nile St., Bakersfield, Calif., secretary-treasurer.

Mid-Coast Veterinary Medical Association, the first Thursday of each month. William P. Matulich, P. O. Box 121, San Luis Obispo, Calif., secretary-treasurer.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. V. Todorovic, 47 Mann Ave., Watsonville, Calif., secretary.

Northern California Association of Veterinarians, the second Tuesday of the month. Andrew F. Giambroni, P.O. Box 782, Red Bluff, Calif., secretary.

North San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month at the Hotel Co-vell, in Modesto, Calif. T. J. Carleton, 325 W. Lockeford St., Lodi, Calif., secretary-treasurer.

Orange Belt Veterinary Medical Association, the second Monday of each month. R. Y. Foos, P.O. Box 955, Victorville, Calif., secretary-treasurer.

Orange County Veterinary Medical Association, the third Thursday of each month. H. M. Stanton, 1122 S.E. U.S. Highway 101, Tustin, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of the month. R. M. Grandfield, 416 Stephens Rd., San Mateo, Calif., secretary-treasurer.

Redwood Empire Veterinary Medical Association, the third Thursday of the month. R. R. Rediske, 833 Vallejo Ave., Novato, Calif., secretary-treasurer.

Sacramento Valley Veterinary Medical Association, the second Wednesday of the month. E. C. Story, 4819 "V" St., Sacramento 17, Calif., secretary-treasurer.

San Diego County Veterinary Medical Association, the fourth Tuesday of the month. Robert F. Burns, 7572 North Ave., Lemon Grove, Calif., secretary-treasurer.

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San Fernando Valley Chapter SCVMA, the second Tuesday of each month at 7:30 p.m., Hody's Restaurant, North Hollywood, Calif. Barbara G. Shirley, Canoga Park, Calif., secretary-treasurer.

San Fernando Valley Veterinary Medical Association, the second Friday of each month at the Casa Escobar Restaurant in Studio City. John Chudacoff, 7912 Sepulveda Blvd., Van Nuys, Calif., secretary.

Santa Barbara-Ventura Counties Veterinary Medical Association, every three months, no set date. Gerald M. Clark, 5415 8th St., Carpinteria, Calif., secretary-treasurer.

Santa Clara Valley Veterinary Medical Association, the last Tuesday of the month. Robert L. King, 1269 Grant St., Santa Clara, Calif., secretary-treasurer.

Southern California Veterinary Medical Association, the third Wednesday of the month. Mr. Don Mahan, 1919 Wilshire Blvd., Los Angeles 57, Calif., executive secretary.

COLORADO—Denver Area Veterinary Medical Society, the fourth Tuesday of every month. Gene M. Bierhaus, 2896 S. Federal Blvd., Englewood, Colo., secretary-treasurer.

Northern Colorado Veterinary Medical Society, the first Wednesday of each month, in Fort Collins. Dr. James Voss, Veterinary Hospital, Colorado State University, Fort Collins, Colo., secretary.

DELAWARE—New Castle County Veterinary Medical Association, the first Tuesday of each month at 9:00 p.m. in the Hotel Rodney, Wilmington, Del. A. P. Mayer, Jr., R.F.D. 2, Newark, Del., secretary-treasurer.

DISTRICT OF COLUMBIA—District of Columbia Veterinary Medical Association, the second Tuesday evenings of January, March, May, and October. R. B. Gochenour, 10109 Ashwood Dr., Kensington, Md., secretary-treasurer.

FLORIDA—Big Bend Veterinary Medical Association, meets the first Sunday of each month at 5:00 p. m., at the Tallahassee Dining Room, Tallahassee. C. Paul Vickers, P.O. Box 309, Tallahassee, secretary.

Central Florida Veterinary Medical Association, the first Friday of each month at 8:00 p. m., place specified monthly. L. R. Poe, 753 W. Fairbanks Ave., Winter Park, Fla., secretary-treasurer.

Florida West Coast Veterinary Medical Association, the second Wednesday of each month at the Lighthouse Inn, St. Petersburg. Fred Jones, 3606 S. Dale Mabry, Tampa, Fla., secretary.

Hillsborough County Veterinary Medical Society, the second Monday evening of each month. For additional information as to the location of each meeting, contact: J. J. Metz, Jr., 5207 Nebraska Ave., Tampa 3, Fla., secretary.

Jacksonville Veterinary Medical Association, the first Thursday of every month. Dodson's Restaurant, Stephen C. Hite, 5807 105th St., Jacksonville 10, Fla., secretary.

Northwest Florida Veterinary Medical Society, third Wednesday of each month, time and place specified monthly. John Webb, P.O. Box 183, Cantonment, Fla., secretary-treasurer.

Palm Beach Veterinary Society, the last Thursday evening of each month. McArthur Dairy Building, Four Points, W. Palm Beach. B. W. Bigger, 2833 S. 4th St., Fort Pierce, Fla., secretary.

Ridge Veterinary Medical Association, the fourth Thursday of each month in Bartow, Fla. John S. Haromy, Route #1, Box 107-A, Lake Wales, Fla., secretary.

South Florida Veterinary Society, the third Wednesday of each month. Time and place specified monthly. Joe B. O'Quinn, 1690 E. 4th, Hialeah, Fla., secretary.

Suwannee Valley Veterinary Association, the fourth Tuesday of each month, Hotel Thomas, Gainesville. G. L. Burch, P.O. Box 405, Ocala, Fla., secretary-treasurer.

Volusia County Veterinary Medical Association, the fourth Thursday of each month. Robert E. Cope, 127 E. Mason, Daytona Beach, Fla., secretary.

GEORGIA—Atlanta Veterinary Medical Society, the third Thursday of each month at the Elk's Home, 726 Peachtree St., Atlanta. Clare L. Bromley, 634 Northside Dr., N.W., Atlanta, Ga., secretary.

Georgia-Carolina Veterinary Medical Association, the second Monday of each month at 8:00 p.m., at the Town Tavern, Augusta, Ga. J. A. Schmitz, 1711 Gwinnett St., Augusta, Ga., secretary.

North Georgia Veterinary Medical Association, quarterly, no set date, the spring meeting at the Veterinary School, Athens, Ga. S. J. Shirley, Commerce, Ga., secretary.

Southeast Georgia Veterinary Medical Association, quarterly, date and meeting place varies. Hugh F. Arundel, P.O. Box 153, Statesboro, Ga., secretary.

South Georgia Veterinary Medical Association, the second Sunday of each quarter at 3:30 p.m., at the Radium Springs Hotel, Albany, Ga. M. W. Hale, Route 2, Tifton, Ga., secretary.

ILLINOIS—Central Illinois Veterinary Medical Association, June 9, Sept. 9, and Dec. 10, 1959. Paul B. Doby, 4 Owens Lane, Springfield, secretary.

Chicago Veterinary Medical Association, the second Tuesday of each month, Charles H. Armstrong, 1021 Davis St., Evanston, secretary.

INDIANA—Calumet Area Veterinary Medical Association, the first Thursday of each month. Bruce Sharp, Box 166, Hobart, Ind., secretary-treasurer.

Central Indiana Veterinary Medical Association, the second Wednesday of each month. P. T. Parker, 224 N. Mill St., Plainfield, Ind., secretary-treasurer.

Michiana Veterinary Medical Association, the second

(Continued on adv. p. 52)



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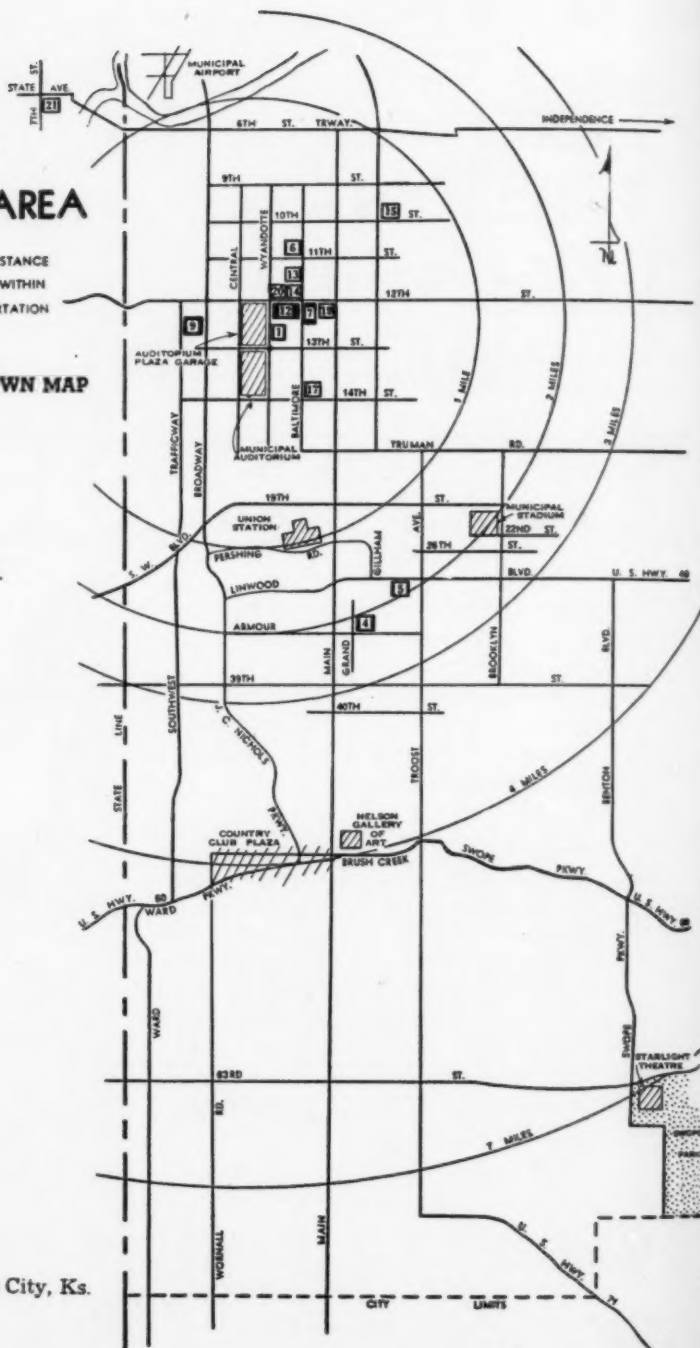
Map of the GREATER KANSAS CITY AREA

ALL HOTELS NOT IN WALKING DISTANCE
OF MUNICIPAL AUDITORIUM ARE WITHIN
10 MINUTES BY PUBLIC TRANSPORTATION

HOTEL LIST AND DOWNTOWN MAP

NO. HOTEL

- 1 Aladdin,
1213 Wyandotte
- 4 Bellerive,
214 East Armour Blvd.
- 5 Berkshire,
1021 E. Linwood
- 6 Continental,
11th & Baltimore
- 7 Dixon,
12th & Baltimore
- 9 Kansas Citian,
1216 Broadway
- 12 Muehlebach,
12th & Baltimore
- 13 New Yorker,
1114 Baltimore
- 14 Phillips,
12th & Baltimore
- 15 Pickwick,
10th & McGee
- 17 President,
14th & Baltimore
- 19 Senator,
17 W. 12th St.
- 20 State,
12th & Wyandotte
- 21 Town House,
7th and State, Kansas City, Ks.



HOTEL INFORMATION — KANSAS CITY, MO., CONVENTION

Ninety-Sixth Annual AVMA Meeting, Aug. 23-27, 1959

All requests for hotel accommodations will be handled by a Housing Bureau in cooperation with the Committee on Local Arrangements. The Bureau will clear all requests and confirm reservations.

Hotel and Rate Schedule

Map No.	Hotel	Single	Double	Twin	Suite
1.	Aladdin*	\$4.50-8.50	\$ 6.50-10.50	\$ 9.50-12.00	\$17.00-30.00
4.	Bellerive*	5.00-9.00	8.00-12.00	9.00-13.00	From \$18.00
5.	Berkshire*	5.00-7.00	7.00-10.00	8.50-10.00	From \$14.00
6.	Continental*	6.50-11.00	8.50-13.50	10.00-14.00	\$20.00-32.00
7.	Dixon	4.50-7.00	6.50-9.00	8.00-12.00	- - - - -
9.	Kansas Citian	3.50-8.00	5.50-11.00	7.00-14.00	From \$10.00
12.	Muehlebach*	Headquarters Hotel — No Room Accommodations			
13.	New Yorker	5.50-12.00	8.00-14.00	9.50-14.00	\$23.00
14.	Phillips*	7.50-10.50	9.50-13.00	11.50-14.00	\$20.50-35.00
15.	Pickwick*	5.85-10.85	6.35-10.85	8.35-12.50	From \$14.00
17.	President*	6.50-10.00	9.50-13.00	11.00-15.00	\$25.00
19.	Senator	3.50-7.00	5.00-10.00	6.00-10.00	\$15.00
20.	State	4.75-6.50	7.50-8.75	8.75-9.25	- - - - -
21.	Town House*	5.50-12.00	10.00-13.50	11.00-16.00	From \$23.00

*100 per cent air-conditioned; in other hotels listed, majority of rooms air-conditioned.

FAMILY PLAN—The above hotels offer a "family plan" whereby children under 14 years of age will be accommodated in the same room with their parents at no extra charge. If more than one room is required to accommodate children, the hotel will charge only the single rate for each room.

MOTELS—Reservations for motels in the Kansas City area may be made through the Kansas City Convention and Visitors Bureau, 1030 Baltimore Ave., Third Floor, Kansas City 5, Missouri.

PLEASE USE APPLICATION ON REVERSE SIDE FOR HOTEL ACCOMMODATIONS

Application for Hotel Accommodations

1959 AVMA Convention — Kansas City, Missouri

The Convention and Visitors Bureau will make every effort to place you according to your expressed wishes, or to best advantage elsewhere if that is not possible and you desire us to do so.

Please give us the complete information requested below. At least four choices of hotels, or more if you desire, are necessary. Arrange for double occupancy of rooms wherever possible; only a limited number of single rooms is available.

Date.....

Please make hotel reservation in accordance with the following:

Accommodations desired: .

Hotel.....First Choice

Hotel.....Second Choice

Hotel.....Third Choice

Hotel.....Fourth Choice

.....Room WITH bath for one person Rate per room desired \$..... to \$.....

.....Room WITH bath for two persons Rate per room desired \$..... to \$.....
(double bed)

.....Room WITH bath for two persons Rate per room desired \$..... to \$.....
(twin beds)

.....Large room WITH bath for..... Rate per room desired \$..... to \$.....
persons

.....Suite—Parlor,Bedroom(s) with bath for persons. Rate per suite
desired \$.....

Arrival date....., hour.....A. M.P. M.

Departure date.....

If reservation cannot be made in one of the hotels indicated shall we place you elsewhere? Yes..... No.....

Please check your mode of transportation: Car..... Train..... Plane..... Bus.....

Rooms will be occupied by (NAMES OF ALL PARTIES MUST BE LISTED)
(PLEASE PRINT)

NAME	STREET ADDRESS	CITY	STATE

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Name

Street address

City State

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Thursday of every month except July and December, at the Hotel LaSalle, South Bend, Ind. Stanton Williamson, 217 W. Chippewa St., South Bend, Ind., secretary.

Tenth District Veterinary Medical Association, the third Thursday of each month. J. S. Baker, P.O. Box 52, Pendleton, Ind., secretary.

IOWA—Cedar Valley Veterinary Medical Association, the second Monday of each month, except January, July, August, and October in Black's Tea Room, Waterloo, Iowa. A. J. Cotten, P.O. Box 183, Grundy Center, secretary.

Central Iowa Veterinary Medical Association, the third Monday of each month except June, July, and August at 6:30 p.m., Breeze House, Ankeny, Iowa. S. L. Hendricks, secretary-treasurer.

Central Iowa Veterinary Medical Association, the third Monday of each month, except June, July, and August, at 6:30 p.m., Breeze House, Ankeny, Iowa. John Herrick, 202 S. Hazel Ave., Ames, secretary.

Coon Valley Veterinary Medical Association, the second Wednesday of each month, September through May, at 7:30 p.m., Cobblestone Inn, Storm Lake, Iowa. Robert McCutcheon, Holstein, secretary.

East Central Iowa Veterinary Medical Society, the Second Thursday of each month at 6:30 p.m., usually in Cedar Rapids, Iowa. T. F. Bartley, P.O. Box 454, Cedar Rapids, secretary.

Fayette County Veterinary Medical Association, the third Thursday of each month at 6:30 p.m. in West Union, Iowa. H. J. Morgan, West Union, secretary.

Lakes Veterinary Association, the first Tuesday of each month, September through May, at 6:30 p.m., at the Gardson Hotel, Estherville, Iowa. Barry Barnes, P.O. Box 162, Milford, secretary.

North Central Iowa Veterinary Medical Association, the third Thursday of April, at the Warden Hotel, Fort Dodge, Iowa. H. Engelbrecht, P. O. Box 797, Fort Dodge, secretary.

Northeast Iowa-Southern Minnesota Veterinary Association, the first Tuesday of February, May, August, and November at the Wineslick Hotel, Decorah, Iowa, 6:30 p.m. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Northwest Iowa Veterinary Medical Association, the second Tuesday of February, May, September, and December, at the Community Bldg., Sheldon. W. Ver Meest Hull, secretary.

Southeastern Iowa Veterinary Association, the first Tuesday of each month at Mt. Pleasant, Iowa. Warren Kilpatrick, Mediapolis, secretary.

Southwestern Iowa Veterinary Medical Association, the first Tuesday of April and October, Hotel Chieftain, Council Bluffs, Iowa. J. P. Stream, 202 S. Stone St., Creston, secretary.

Upper Iowa Veterinary Medical Association, the third Tuesday of each month at 7:00 p.m., at All Vets Center, Clear Lake, Iowa. W. A. Danker, Dows, Iowa, secretary.

KENTUCKY—Central Kentucky Veterinary Medical Association, the first Wednesday of each month. R. H. Folsom, P.O. Box 323, Danville, Ky., secretary.

Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday of each month in Louisville or within a radius of 50 miles, except January, May, and July. G. R. Comfort, 2102 Reynolds Lane, Louisville, Ky., secretary-treasurer.

LOUISIANA—New Orleans Veterinary Medical Association, the third Thursday of every month at the Monileone Hotel, New Orleans, at 8:30 p. m. Ronald C. Francis, 6421 Chef Menteur Highway, New Orleans, La., secretary-treasurer.

MARYLAND—Baltimore City Veterinary Medical Association, the second Thursday of each month, September

through May (except December), at 9:00 p.m., at the Park Plaza Hotel, Charles and Madison St., Baltimore, Md. Leonard D. Krinsky, 6111 Hartford Rd., Baltimore, Md., secretary.

MICHIGAN—Central Michigan Veterinary Medical Association, the first Wednesday of every month at 7 p.m. Jerry Fries, 2070 E. Main St., Owosso, Mich., secretary.

Mid-State Veterinary Medical Association, the fourth Thursday of each month with the exception of November and December. Robert W. Acton, 4110 Spring Rd., Jackson, Mich.

Saginaw Valley Veterinary Medical Association, the last Wednesday of each month. Alvin R. Conquest, P.O. Box 514, Grand Blanc, Mich., secretary.

Southeastern Michigan Veterinary Medical Association, the fourth Wednesday of every month, September through May. Louis J. Rossoni, 24531 Princeton Ave., Dearborn 8, Mich., secretary.

MISSOURI—Greater St. Louis Veterinary Medical Association, the first Friday of each month (except July and August), at the Coronado Hotel, Lindell Blvd. and Spring Ave., St. Louis, Mo., at 8 p.m. Edwin E. Epstein, 4877 Natural Bridge Ave., St. Louis 15, Mo., secretary.

Kansas City Veterinary Medical Association and Kansas City Small Animal Hospital Association, the third Thursday of each month at the Hotel President, Kansas City, Mo. Robert E. Guilfoil, 18 N. 2nd St., Kansas City 18, Kan., secretary.

NEVADA—Western Nevada Veterinary Society, the first Tuesday of each month. Paul S. Silva, 1170 Airport Road, Reno, Nev., secretary.

NEW JERSEY—Central New Jersey Veterinary Medical Association, the second Thursday of November, January, March, and May at Old Hights Inn, Hightstown, N. J. David C. Tudor, R.D. 1, Box 284A, Cranbury, N. J., secretary.

Metropolitan New Jersey Veterinary Medical Association, the third Wednesday evening of each month from October through April, except December, at the Irvington House, 925 Springfield Ave., Irvington, N.J. Bernard M. Weiner, 787 Clinton Ave., Newark, N.J., secretary.

Northern New Jersey Veterinary Association, the fourth Tuesday of each month at the Elks Club, Hackensack. James R. Tanzola, Upper Saddle River, N.J., secretary.

Northwest Jersey Veterinary Society, the third Wednesday of every odd month. G. L. Smith, P.O. Box 938, Trenton, N.J., secretary.

South New Jersey Veterinary Medical Association, the fourth Tuesday of each month at the Collmont Diner, Collingswood, N.J. Marvin Rothman, 718 Dwight Ave., Collingswood, N.J., secretary.

NEW MEXICO—Bernalillo County Veterinary Practitioners Association, the third Wednesday of each month, Fex Club, Albuquerque. Donald W. Fitzgerald, 1825 Lomas Blvd., N.E., Albuquerque, N.M., secretary-treasurer.

NEW YORK—New York City, Inc., Veterinary Medical Association of, the first Wednesday of each month at the New York Academy of Sciences, 2 East 63rd St., New York City. C. E. DeCamp, 43 West 61st St., New York 23, N. Y., secretary.

Monroe County Veterinary Medical Association, the first Thursday of even-numbered months except August. Irwin Bircher, 50 University Ave., Rochester, N. Y., secretary.

NORTH CAROLINA—Central Carolina Veterinary Medical Association, the second Wednesday of each month at 7:00 p.m. in the O'Henry Hotel, Greensboro. C. G. Sims, 2450 Battleground Ave., Greensboro, N. Car., secretary.

Eastern North Carolina Veterinary Medical Association, the last Tuesday evening of each month, time and place specified monthly. Byron H. Brow, Box 453, Goldsboro, N. Car., secretary-treasurer.

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References: 1. Vigue, R. F.: J.A.V.M.A. 133:326 (Sept. 15) 1958. 2. Shaw, J. C.: Personal communication. 3. Pollock, S.: Vet. Med. 54:97 (Feb.) 1959. 4. Rabin, P. H.: Personal communication. 5. Hoffer, S. H.: Personal communication. 6. Weir, H. T., and Hazelrig, J. W.: Personal communication. 7. Beck, J. W.: Personal communication. 8. Bull, W. S.: Personal communication. 9. Fessenden, P. E.: Personal communication. 10. Lohmeyer, C.: Personal communication.

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Piedmont Veterinary Medical Association, the last Friday of each month. J. G. Martin, Boone, N. Car., secretary.

Twin Carolinas Veterinary Medical Association, the third Friday of each month at Orange Bowl Restaurant, Rockingham, N. Car., at 7:30 p.m. J. E. Currie, 690 N. Leak St., Southern Pines, N. Car., secretary.

Western North Carolina Veterinary Medical Association, the second Thursday of every month at 7:00 p.m. in the George Vanderbilt Hotel, Asheville, N. Car. Viru Lind, 346 State St., Marion, N. Car., secretary.

OHIO—Cincinnati Veterinary Medical Association, the third Tuesday of every month at Shuller's Wigwam, 6210 Hamilton Ave., at North Bend Road. G. C. Lewis, 491 E. Galbraith Rd., Cincinnati, Ohio, secretary-treasurer.

Columbus Academy of Veterinary Medicine, every month, September through May. E. M. Simonson, 3120 Valley View Dr., Columbus, Ohio, secretary-treasurer.

Cuyahoga County Veterinary Medical Association, the first Wednesday in September, October, December, February, March, April and May, at 9:00 p.m. at the Carter Hotel, Cleveland, Ohio. F. A. Coy, 8208 Carnegie Ave., Cleveland, Ohio, secretary.

Dayton Veterinary Medical Association, the third Tuesday of every month. O. W. Fallang, 6941 Far Hills Ave., Dayton, secretary.

Killbuck Valley Veterinary Medical Association, the first Wednesday of alternate months beginning with February. C. Gale, Wooster, Ohio, secretary-treasurer.

Mahoning County Veterinary Medical Association, the Fourth Tuesday of each month, at 9:00 p.m. Youngstown Maennerchor Club, Youngstown, Ohio. Sam Segall, 2935 Glenwood Ave., Youngstown, secretary.

Miami Valley Veterinary Medical Association, the first Wednesday of December, March, June, and September. J. M. Westfall, Greenville, Ohio, secretary-treasurer.

North Central Ohio Veterinary Medical Association, the last Wednesday of each month except during the summer. R. W. McClung, Tiffin, Ohio, secretary-treasurer.

Northwestern Ohio Veterinary Medical Association, the last Wednesday of March and July. C. S. Alvanos, 1683 W. Bancroft St., Toledo, Ohio, secretary-treasurer.

Stark County Veterinary Medical Association, the second Tuesday of every month, at McBrides Emerald Lounge, Canton, Ohio. M. L. Willen, 4423 Tuscarawas St., Canton, Ohio, secretary.

Summit County Veterinary Medical Association, the last Tuesday of every month (except June, July, and August), at the Mayflower Hotel, Akron, Ohio. M. L. Scott, 42 W. Market St., Akron, Ohio, secretary-treasurer.

Tri-County Veterinary Medical Association, the fourth Wednesday of January, May, and September. Mrs. R. Slusher, Mason, Ohio, secretary-treasurer.

OKLAHOMA—Oklahoma County Veterinary Medical Association, the second Wednesday of every month, 7:30 p.m., Patrick's Foods Cafe, 1016 N.W. 23rd St., Oklahoma City. Claude A. Tigert, 3032 N.W. 68th St., Oklahoma City, Okla., secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month at the City-County Health Building, 4616 E. 15th St., Tulsa, Okla. Arlen D. Hill, 5302 E. 11th St., Tulsa, Okla., secretary.

Tulsa Association of Small Animal Veterinarians, first and third Mondays, City-County Health Dept. T. E. Messler, 3104 E. 51st St., Tulsa, Okla., secretary.

OREGON—Portland Veterinary Medical Association, the second Tuesday of each month, at 7:30 p.m. Ireland's Restaurant, Lloyds, 718 N.E. 12th Ave., Portland. Donald L. Moyer, 8415 S.E. McLoughlin Blvd., Portland 2, Ore., secretary.

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Willamette Veterinary Medical Association, the third Tuesday of each month, except July and August, at the Marion Hotel, Salem. Robert J. Mallorie, P.O. Box 155, Silverton, Ore., secretary.

PENNSYLVANIA—Keystone Veterinary Medical Association, the fourth Wednesday of each month at the University of Pennsylvania School of Veterinary Medicine. Raymond C. Snyder, N.E. Corner 47th St. and Hazel Ave., Philadelphia 43, Pa., secretary.

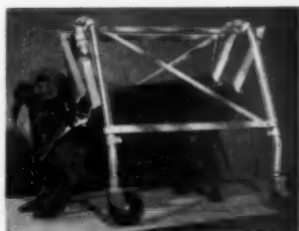
Lehigh Valley Veterinary Medical Association, the first Thursday of each month. Stewart Rockwell, 10th and Chestnut Sts., Emmaus, Pa., secretary.

Pennsylvania Northern Tier Veterinary Medical Association, the third Wednesday of each odd numbered month. R. L. Michel, Troy, Pa., secretary.

SOUTH CAROLINA—Piedmont Veterinary Medical Association, the third Wednesday of each month at the Fairforest Hotel, Union, S. Car. Worth Lanier, York, S. Car., secretary.

Georgia-Carolina Veterinary Medical Association—see GEORGIA.

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TEXAS—Coastal Bend Veterinary Association, the second Wednesday of each month. Jack E. Habluetzel, Route 1, Box 65-N, Ingleside, Texas, secretary.

Dallas County Veterinary Medical Association, the first Tuesday of each month at 7:30 p.m., at a place to be specified. Frank N. Black, 12830 Preston Rd., Dallas, Texas, corresponding secretary.

UTAH—Salt Lake Small Animal Hospital Association, the first Monday of every month, at the Holiday Inn, 3040 South State St., Salt Lake City, at 12:15 p. m. Douglas H. McKelvie, 1220 S. State St., Salt Lake City, Utah, secretary-treasurer.

VIRGINIA—Central Virginia Veterinary Association, the second Thursday of each month at 8:00 p. m., except July and August, at a place in Richmond to be announced monthly. Edwin M. Crawford, secretary-treasurer.

Northern Virginia Veterinary Conference Association, the second Tuesday of each month. T. P. Koudelka, P.O. Box 694, Harrisonburg, Va., secretary.

Northern Virginia Veterinary Society, the second Wednesday of every third month. Meeting place announced by letter. H. C. Newman, Box 145, Merrifield, secretary.

Southwestern Virginia Veterinary Medical Association, the first Thursday of each month. D. F. Watson, Blacksburg, secretary.

WASHINGTON—Seattle Veterinary Medical Association, the third Monday of each month, Magnolia American Legion Hall, 2870 32nd W., Seattle. Roy C. Toole, 10415 Main St., Bellevue, secretary.

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South Puget Sound Veterinary Association, the second Thursday of each month except July and August. B. D. Benedictson, 3712 Plummer St., Olympia, Wash., secretary.

WEST VIRGINIA—Kyowva (Ky., Ohio, W. Va.) Veterinary Medical Association, the third Thursday of each month in the Hotel Pritchard, Huntington, W. Va., at 8:30 p.m. Harry J. Fallon, 200 5th St., W. Huntington, W. Va., secretary.

WISCONSIN—Central Wisconsin Veterinary Medical Association, the second Tuesday of each quarter (March, June, Sept., Dec.) C. R. Carlson, 1109 E. LaSalle Ave., Barron, Wis., secretary.

Coulee Region Veterinary Medical Association, the third Wednesday of every other month. F. N. Petersen, Box 127, Cashton, Wis., secretary.

Dane County Veterinary Medical Association, the second Thursday of each month. Dr. E. P. Pope, 409 Farley Ave., Madison, Wis., secretary.

Milwaukee Veterinary Medical Association, the third Tuesday of each month, at the Half-Way House, Blue Mound Rd. Dr. Raymond Pahle, 10827 W. Oklahoma Ave., Milwaukee, Wis.

Northeastern Wisconsin Veterinary Medical Association, the third Wednesday in April. William Madsen, 218 E. Washington St., Appleton, Wis., secretary.

Rock Valley Veterinary Medical Association, the first Wednesday of each month. L. C. Allenstein, 209 S. Taft St., Whitewater, Wis., secretary.

Southeastern Veterinary Medical Association, the third Thursday of each month. John R. Curtis, 419 Cook St., Portage, Wis., secretary.

Wisconsin Valley Veterinary Medical Association, the second Tuesday of every other month. John B. Fleming, 209 E. 4th St., Marshfield, Wis., secretary.



Diamond Laboratories Acquires Research Farm

Diamond Laboratories has announced the acquisition of a farm near the Des Moines Municipal Airport. Included in the acquisition are three large barns, a hog house, machinery building, silo, brick dwelling, and forty acres of pasture.

Diamond plans to conduct studies and research on the control and prevention of disease in livestock, after completing minor construction to transform the facilities from a normal farm operation to that of their research needs.

Some of the immediate research endeavors to be pursued will include: growth studies resulting from the use of new drugs; the value and safety of new and improved vaccines and serums; the control of hog cholera, erysipelas, leptospirosis, mastitis, and anemia.

The newly acquired facilities will permit more effective control studies, with 200-500 head of livestock housed at the farm, the number varying with the type of research project under study.

The various phases of the research program will be directed by: Dr. C. G. Boylan, director of biologicals; Ted Jamison, serum plant manager; and Dr. Fred Zuscck, biological research director.

Dr. Stokstad Joins American Cyanamid

Dr. E. L. R. Stokstad, the first scientist to establish the growth-promoting effect of antibiotics on animals, has been appointed director of research for American Cyanamid Company's Agricultural Division.

Early in his scientific career, Dr. Stokstad discovered vitamin K with Dr. H. J. Almquist at the University of California. While serving as a Lalor fellow at California Institute of Technology, he began his studies on the isolation of folic acid, a vitamin required for blood cell formation.

He was one of the first to show the effect of vitamin B₁₂ in curing pernicious anemia, and studied the role of this vitamin in animal and bacterial nutrition. More recently, he discovered that selenium, previously known as highly toxic material, is an essential dietary nutrient for several animals.

Dr. Stokstad has also isolated and determined the chemical structure of thioctic acid, a vitamin for certain lower forms of life and a key compound in the metabolism of carbohydrates by animals and microorganisms.

In 1951, he received the Tom Newman award in England for research in poultry science, and in 1952, was awarded the Poultry Science Association Borden award for his research in poultry science.

A prolific writer, Dr. Stokstad has co-authored 134 published articles on nutritional subjects and was senior author of 47.

Pitman-Moore Releases New Globulon

Pitman-Moore Company, Division of Allied Laboratories, Inc., has announced the release of Globulon, a purified solution of canine beta and gamma globulins, the antibody containing fractions of blood. The product is purified through the process of alcohol fractionation using methods similar to those for human gamma globulin, and is assayed both qualitatively and quantitatively by electrophoretic analysis.

Globulon has similar indications in veterinary medicine as human gamma globulin has in the treatment and prophylaxis of human infections. Protection against the common canine infections—distemper, hepatitis, and leptospirosis—is provided by only one-fifth the dose formerly required with antiserum. Extensive clinical investigations indicate that Globulon is effective in the treatment of a wide variety of infectious conditions, and has a synergistic effect when used in combination with antibiotics, sulfonamides and other therapeutic agents.

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An improved vaccine giving long-lasting immunization against rabies for dogs and cats is being made available to veterinarians by American Cyanamid Company.

This new vaccine is a centrifuged product containing a modified live virus of chick embryo origin in a 40 per cent suspension. These changes over the previous Cyanamid rabies vaccine permit a reduction in the dosage from 3cc. to 2cc. This smaller dosage greatly reduces the pain on injection as well as postvaccinal reactions.

Dr. Conrad Appointed to Staff of Heisdorf & Nelson Farms

Dr. Robert D. Conrad (OSU '53) has joined the staff of the research laboratory of Heisdorf & Nelson Farms, Inc., Kirkland, Wash.

Dr. Conrad was a member of the staff at Washington State College where he taught poultry disease courses and assisted in the veterinary and bacteriology laboratories. He was also responsible for poultry disease diagnosis for the Eastern Washington Agricultural Extension Service.

The recipient of the first Dr. Salsbury's National Turkey Federation fellowship, Dr. Conrad is continuing work toward a Ph.D. degree in bacteriology from Washington State College.

Dr. Rosenberger Appointed to Post at Armour

James H. Rosenberger (OSU '48), has joined the veterinary technical department of the Armour Pharmaceutical Company as assistant director.

Dr. Rosenberger received his B.S. in agriculture *summa cum laude* at Ohio State University in 1948, M.S. in agriculture *magna cum laude* in 1951, and his D.V.M. *summa cum laude* at the same university in 1952.

He entered private partnership practice after graduation and located in Clinton, Wis., where he conducted an extensive general veterinary practice until his new appointment.

Dr. McKay Assumes New Duties for Cyanamid International

Dr. William McKay has been appointed to the newly-created post of agricultural and scientific coordinator, European region, for Cyanamid International.

Dr. McKay has had many years of experience in the fields of animal nutrition and veterinary medicine. He is a graduate of the Royal Dick Veterinary College, Edinburgh, and Aberdeen University, Scotland.

His appointment will strengthen the technical support and agricultural research programs carried on by Cyanamid within the European region. Dr. McKay will be assigned to the staff of Cyanamid's European regional director in Zurich, Switzerland.

Pfizer Appoints Dr. Kalish Veterinary Medical Aide

Dr. Simon J. Kalish (MSU '52), has been appointed associate veterinary medical director of Pfizer Laboratories, division of Chas. Pfizer & Co., Inc.

A former public health veterinarian, Dr. Kalish was awarded his Ph.D. degree in veterinary medicine by Michigan State University in 1953, and a M.P.H. degree by the University of Michigan in 1956.

Dr. Kalish has served as a research associate at Wayne County General Hospital, a faculty research associate in epidemiology at the University of Michigan, a senior veterinarian with the Detroit Department of Health, and public health veterinarian with the West Virginia Department of Health.



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COMMERCIAL WANT ADS—\$5.00 for the first 25 words, 25 cents for each additional word; \$1.00 for use of box number. (See paragraph above for total word count.)

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DEADLINES

1st of month issue — 6th of month preceding date of issue.

15th of month issue — 20th of month preceding date of issue.

Names of classified advertisers using key letters can not be supplied. Address your reply to the box number, c/o JOURNAL of the AVMA, 600 S. Michigan Ave., Chicago 5, Ill., and it will be sent to the advertiser.

Wanted—Veterinarians

Wanted—assistant veterinarian for small animal hospital in Chicago. Good opportunity. Address Box L 33, JOURNAL of the AVMA.

Associate for well established southern California mixed practice, 90 per cent small animal. California license required; good future for right man. Address Box M 2, JOURNAL of the AVMA.

Veterinarian wanted to assist in general practice in central Pennsylvania. Prefer recent graduate. Starting salary \$100 per week and car expenses. Address Box M 3, JOURNAL of the AVMA.

Recent graduate wanted for growing suburban small animal hospital. Draftable or part time considered. Morton Grove Animal Hospital, 9128 Waukegan Road, Morton Grove, Ill.

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Recent graduate wanted as assistant for small animal clinic, southern California. Salary plus bonus; no smog. Note availability, qualifications in first letter. Address Box M 12, JOURNAL of the AVMA.

Veterinarian experienced in mixed practice, New York licensed, to associate in partnership. Well established practice. Address Box M 16, JOURNAL of the AVMA.

Wanted—Positions

Veterinarian, age 30, 1954 graduate, licensed in New York and Connecticut, military obligation completed, desires position in well established small animal hospital leading to permanent future. Address Box M 6, JOURNAL of the AVMA.

Veterinarian, 1954 graduate, background of three years as resident in veterinary pathology at Armed Forces Institute of Pathology, desires challenging research position with institution or commercial organization. Willing to live overseas. Address Box M 7, JOURNAL of the AVMA.

Young, ambitious Cornell '57 graduate, returning from the service this October, desires position in New York state small animal hospital, leading to permanent future. Have experience. Address Box M 11, JOURNAL of the AVMA.

Graduate (KSC '55) completing military obligation October, 1959, seeks position leading to partnership or ownership, Midwest or West. Experience in dairy practice and small animals. Reply airmail to: Capt. J. W. Feeter, 81st Tac Hospital, APO 755, New York, N.Y.

Wanted—Practices

Experienced veterinarian seeks purchase or lease of Maryland practice, small animal or predominantly small animal; 34, licensed. Please contact Baltimore, phone PLaza 2-5487, between 5 and 8 p.m.

Veterinarian in own successful large animal practice for five years, desires association in two- or three-man practice leading to partnership. Prefer Middle West. Address Box M 13, JOURNAL of the AVMA.

Will lease or purchase small animal practice. Licensed in Ohio, Maryland, and Michigan. Please send full details and photo. Address Box M 14, JOURNAL of the AVMA.

Want to lease small animal hospital in San Francisco or area. Will consider other California offers. Address Box M 15, JOURNAL of the AVMA.

For Sale or Lease—Practices

Southwest practice and real estate broker, licensed and bonded. If you wish to buy, sell, or lease, contact Charles E. Doyle, D.V.M., 5930 N.W. 39th, Oklahoma City, Okla.

For sale—exclusive small animal hospital, member of A.A.H.A. Modern home recently built, excellent view of ocean, located Maine coast. Address Box L 28, JOURNAL of the AVMA.

For sale—Ohio general practice, established over 20 years, 65 per cent large and 35 per cent small animal practice. Gross for last five years over \$45,000. Price includes 11-room house, small animal hospital, drugs, and equipment. Price \$40,000. Details on inquiry, terms can be arranged. Address Box L 29, JOURNAL of the AVMA.

For sale—Florida's Gold Coast, small animal hospital, practice, modern home, drugs and equipment; \$15,000 to handle, Florida license. Address Box L 30, JOURNAL of the AVMA.

For sale or lease—small animal hospital, District of Columbia. Excellent condition, good potential, selling due to death of owner. Address Box L 41, JOURNAL of the AVMA.

For sale—small animal practice, Maryland license required. Address Box K 7, JOURNAL of the AVMA.

For sale—small animal practice and hospital in Ontario city. Established five years, grossed over \$33,000 in 1958. Address Box M 4, JOURNAL of the AVMA.

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For sale—Washington small animal practice, \$10,000 gross. Opportunity for mixed practice. Real estate, equipment, drugs. Address Box M 8, JOURNAL of the AVMA.

For sale or lease—general practice in northern Indiana. Modern home, office, drugs, and equipment. Address Box M 9, JOURNAL of the AVMA.

For sale or lease—practice, \$30,000 gross, one third small animal and balance large animal. Coastal California, median climate; hospital residence. \$8,000 down; partnership possible. Sportsman's paradise. Address Box M 10, JOURNAL of the AVMA.

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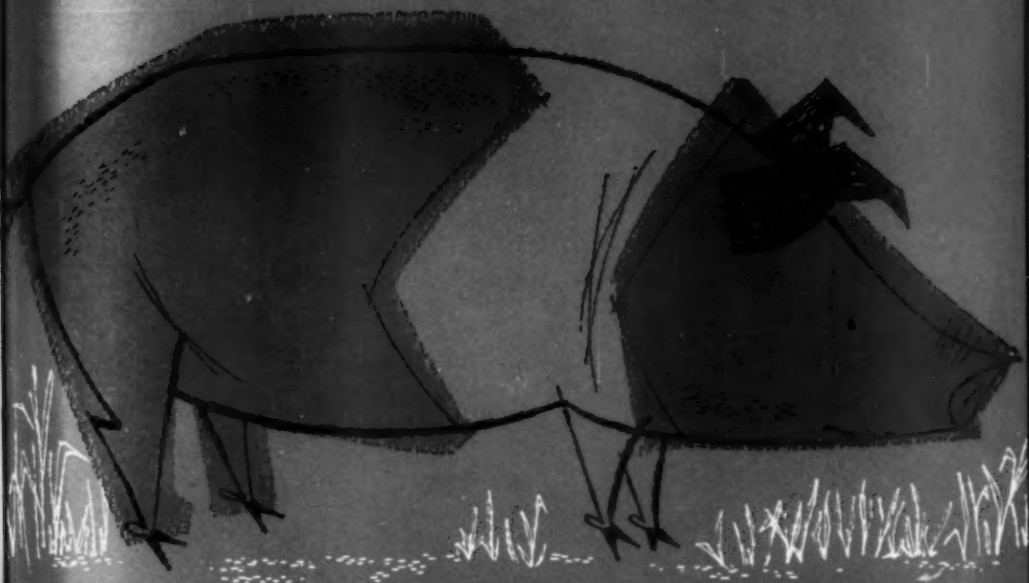
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